NEW SERIES, No. 56. (VOL. VII.) DECEMBER, 1901.

QUARTERLY PUBLICATIONS OF THE

AMERICAN

STATISTICAL ASSOCIATION.

I. PERMANENT CENSUS OFFICE.
II. REVIEWS AND MISCELLANY: NOTES ON FOREIGN CENSUSES, *C.-E. A. Winslow;* NOTES ON VITAL STATISTICS OF AMERICAN CITIES, *C.-E. A. Winslow;* STATISTICS OF DISEASES, *C.-E. A. Winslow;* COST OF HOME-COOKED AND PURCHASED FOOD, *Ava M. Stoddard;* A STUDY OF MUNICIPAL GROWTH, *F. S. Crum;* EARLY CONGRESSIONAL DOCUMENTS, *L. P. L.*

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AMERICAN

STATISTICAL ASSOCIATION.

NEW SERIES, No. 56. DECEMBER, 1901.

PERMANENT CENSUS OFFICE.

Under date of December 4, 1901, a report on the establishment of a permanent Census Office has been submitted by the Director of the Census, Hon. W. R. Merriam, for the use of the Congressional Committees on the Census. As it is likely that only a very limited edition will be printed, it appears desirable to give the report a wider circulation by reprinting it in the *Publications of the American Statistical Association*. The report is prefaced by the following explanatory note signed by the Director of the Census: —

In compliance with requests made by the Chairman of the Committees on the Census of the United States Senate and House of Representatives, an account is presented in the following pages of the efforts which have been made in the past to secure the establishment of a permanent census office, and a summary of the arguments by which this movement was supported. At my request the Assistant Director of the Census and Chief Statisticians have submitted their views on this important subject, based on their actual experience in census work. These statements form Part II of this pamphlet.

PART II. — HISTORICAL SUMMARY.

The establishment of a permanent census office was first advocated by Gen. Francis A. Walker, the able Superintendent of the Ninth and Tenth censuses, in an article contributed to the *Quarterly Journal of Economics* for January,

1888. Speaking from his experience of the difficulty of collecting and digesting, in any reasonable time, the enormous amount of material dealt with in the census of 1880, he said: "What is eminently to be desired in the interests of our statistical service is that the census should be confined to an enumeration of population, coupled only with one other class of statistics, to be hereafter mentioned, such an enumeration to be conducted once in ten years, as now, or better, once in five years, as befits so great and rapidly growing a people; while the remaining statistical inquiries now connected with the census, and even many others required to meet the increasing demand for exact knowledge, should be set on foot and conducted in proper succession by the same bureau of the Government during the intervals of the decennial or quinquennial censuses. Such a system would dispense with the necessity for suddenly raising and suddenly disbanding a large office; would retain permanently in service a considerable force of trained clerks, enabling them to acquire skill, insight, and rapidity of working by continuous experience; and would thus at once diminish the cost and increase the value of the results obtained."

The only class of statistics which, in the opinion of General Walker, ought to be collected at the same time with the statistics of population relates to agriculture. "It would be inexcusable to require the entire surface of the United States to be gone over a second time, on foot or on horseback, for the purpose of collecting the productions of five millions of farms."

He did not, however, in this article, advocate the creation of a permanent census office. "The Census Office has expired by limitation of law. Instead of reviving it in 1888 or 1889, let the taking of the Eleventh Census be charged upon the existing Bureau of the Statistics of Labor, in the Department of the Interior — the department which, since and including 1850, has had supervision of the work."

Mr. Carroll D. Wright, United States Commissioner of Labor, in the *Popular Science Monthly* for November, 1891, expressed his substantial agreement with the views of General Walker. "The very worst form [feature] of the present feature is the temporary nature of the service. * * The first step toward correction lies in the direction of the establishment of a permanent census office, under which there ought to be a constant force of trained and experienced statistical clerks, and the collection of facts [should be] distributed over ten years, instead of being crowded into a few months. * * This would involve the employment constantly of a much reduced office force, and a field force, except for the enumeration of the population, gradually becoming more and more skilful. The expense during the whole ten years would be somewhat larger than is involved, but the results would be of such infinitely greater value, that the increased expense would not be a matter for a moment's consideration."

Senate's Resolution.

The Senate of the United States had already adopted, February 16, 1891, a resolution directing the Secretary of the Interior to consider the expediency of the establishment of a permanent census bureau, and to embody the results of his consideration with a draft of a bill, should he consider it expedient, for the establishment of such census bureau, in a special report to be made to the Senate at the opening of the Fifty-second Congress.

Special Report by Robert D. Porter.

The task of preparing this report devolved, by order of the Secretary, upon Mr. Robert P. Porter, Superintendent of the Eleventh Census, who performed it in a most thorough manner. Senate Doc. No. 1, Fifty-second Congress, First Session, contains, in addition to a convincing argu-

ment in favor of the proposed permanent office, supported by extracts from communications on this subject received by him from numerous officials, statisticians (American and European), churchmen, and representatives of commercial organizations in all parts of the United States, the draft of "a bill to establish a permanent census office and to provide for taking the Twelfth and subsequent censuses." This bill changed the date of the census from June 1 to October 1, and ordered, in addition to the decennial "census of the population, wealth, and industry of the United States," a "periodic collection of vital and social statistics, and of statistics of agriculture, manufactures, mining, fisheries, churches, education, finance, transportation, and insurance." In the organization of the office force, provision was made for the appointment of "five expert chiefs of divisions." The number of supervisors of census was increased from one hundred and seventy-five to three hundred, and their minimum compensation from five hundred dollars to one thousand dollars. The employment of interpreters to assist the enumerators was authorized. The size of enumeration districts was reduced from 4,000 to 2,000 inhabitants. Answers to questions in the census schedules were made obligatory upon the officers of all establishments of productive industry, and not, as theretofore, upon officers of corporations only. Appointments in the Census Office, except of trained clerks and experts of the Eleventh Census, were directed to be made with accordance with the terms of the Civil Service Act. A section was inserted, which was copied from the Census Act of 1875, but had been omitted from that of 1889, pledging the Government to pay one-half the cost of each quinquennial census taken by any state or territory, upon condition of a previous deposit with the Secretary of the Interior of a certified copy of all schedules and reports returned by the officers and agents charged with such enumeration. In other respects this bill was very

nearly a verbatum copy of the Census Act of 1889. It contained thirty sections.

In the appendix to the report will be found a chronological review of legislation concerning the decennial census, an article by Mr. J. J. Noah on the advisability of reducing the decennial to a lesser census period, and the forms of the census schedules used from 1790 to 1870, inclusive, and those schedules which were placed in the hands of the census enumerators (in whole or in part) in 1880 and 1890.

The Porter Bill.

The bill drafted by Mr. Porter was introduced in the Senate, December 13, 1891, by Senator Hale (S. 690), read twice, and referred to the Committee on the Census.

1892.

Hearing by the House Committee.

At the second session of the Fifty-second Congress, a resolution was adopted by the House of Representatives, instructing the Select Committee on the Eleventh Census to inquire into the expediency of establishing a permanent census bureau, That committee had a hearing on the subject, beginning March 25, 1892, at which ten witnesses made statements, among whom were Mr. Porter, General Walker, and Mr. Wright.

Mr. Porter emphasized the lack of sufficient time, under the present system, for the necessary preparation for taking the census. He advocated reform in the employment of expert special agents, and a modification of their relation to the office. He said that the statistics of manufactures in cities and towns having 2,500 inhabitants can be better taken by special agents paid by the day than by enumerators paid by the schedule. He advised the retention of a skeleton force "made up of people who are really statisticians," which should be under civil service rules, "and

the privilege should be given to employ temporary people when the census is taken, who should have some special examination." He proposed the elimination from the census of the inquiries relating to fisheries; transportation; insurance; Indians; farms, homes, and mortgages; education; and veterans of the civil war. These inquiries (omitting education) in the Tenth Census cost in the aggregate $2,050,000. The census of the population should be under the immediate direction of the superintendent, and the other work of the office supervised by five expert statisticians, one each for manufactures, agriculture, social statistics, vital statistics, and wealth and finance.

General Walker believed that a permanent establishment would prove to be in the highest degree economical, "in the sense of preventing errors and getting more for your money." "There are two kinds of economy; one of spending less money, and the other of getting more for your money, and the latter kind of economy can be practiced to a very high degree by a permanent bureau." "It is very much more important that the statistics should be sound when they do come out, than that their publication should be expedited a few months." He expressed his conviction that the head of the office and the chiefs of division and expert special agents need the opportunity for more careful reflection, in order to the perfection of the service, and that this is one of the most weighty arguments in favor of a change of system and method. He spoke of the "tailings" which might be extracted from statistical material which has already been once or twice worked over, which are of no special political, but would be of great statistical and sociological value. "When the next census is in preparation, two or three years should be allowed for the men to be getting their sheets up, or putting their heads together, looking over the results of past work, seeing where they have made mistakes, because no man ever worked without mak-

ing mistakes, and there never was a man who would not do a certain work twenty or thirty per cent better the second time." The facts contained in the schedules "can be combined in almost infinite relations, and to statisticians and economists it is often true that the statistics which attract least popular interest are the most significant and instructive. A comparatively small trained force could work on that kind of material to an extent impossible where you have only half-trained clerks."

Mr. Wright said: "No man, I do not care how great he is, how great a statistician or how great an administrator, can take a census creditably to himself or to the Federal Government under the present system. It can not be done." Our regular army is small, but it is the skeleton of a great organization. It should be so with the census office. The constant bringing in of raw men for statistical work does more damage to statistical accuracy and to the science of statistics than any one element." He argued in favor of a biennial census of industries. As to the bill prepared by Mr. Porter, his chief objection to it was that "it makes a law for the taking of the Twelfth Census. I think there is too much detail in it to be enacted several years in advance."

Report of the House Committee.

The substance of the testimony elicited at this hearing, which lasted until the 20th of May, 1892, was embodied in the report of the committee, February 1, 1893 (H. R. Report No. 2393, Fifty-second Congress, Second Session). "Your committee is of the impression that the field of operation of the census office is so broad, and such a wide range of subjects are now embraced by the several branches of inquiry, that it is impossible to do them full justice with any organization possible under existing law. To accomplish the work now undertaken by the decennial census requires a force so large as to be unwieldy, and which it is impos-

sible to form of proper material. Were the bureau so organized that its work would be continuous, the force required would be comparatively small, and competent statisticians and specialists could be secured for the service. It is also of opinion that the amount of money needed to carry on such a continuous bureau, distributing its work through the ten-year periods, would be materially less than the amount which would be necessary to take the census under the present system; and that, in addition, the work of collection and compilation of the returns would be more accurately and satisfactorily performed, and the results obtained would be of greater value." Together with its report the committee submitted a bill substantially identical with the Porter bill and recommended its passage.

The project of a permanent census office received no further attention in the Fifty-second Congress and none at all in the Fifty-third.

1896.

Special Report by Carroll D. Wright.

The discussion was revived in the Fifty-fourth Congress by the passage of a joint resolution, approved March 19, 1896, directing the Commissioner of Labor (then in charge of the Eleventh Census, Mr. Porter having resigned) to report to Congress for its consideration, as soon as practicable, a plan for a permanent census service.

In response to this resolution Mr. Wright submitted, December 7, 1896, a bill to provide for a permanent census service, with explanatory comments. (Senate Doc. No. 5, Fifty-fourth Congress, Second Session). It contained but twelve sections, and its aim was defined to be: "To provide simply for an organic administrative act, leaving the details of the Twelfth and subsequent censuses to the officers respectively having them in charge." It created a census office "at the seat of government," unconnected with

any existing department, the reason given for this departure from established usage being that "any scientific office can conduct its work much more efficiently when the head of it is alone responsible therefor," and that "the scientific character of census work demands that it be carried on by an officer not subject to the political changes which come to the great departments." All appointments below the grade of assistant director were to be made in accordance with the provisions of the Civil Service Act. The sixth section of the bill defined the scope of the census. Provision was made for a quinquennial census of population, an annual account of agricultural products, a biennial account of representative manufacturing industries, an annual collection of the data of births and deaths obtained from the registration records of states and municipalities possessing such records, and an actual collection of such facts relating to the dependent, delinquent, and defective classes as can be obtained from public records only. The Director of the Census was ordered to submit estimates for a classified force of employes before October 1, 1897, and his suggestions and recommendations as to details necessary for taking the Twelfth and subsequent censuses in December, 1897.

1897.

Hearing by the Senate Committee.

January 9, 1892, the Senate Committee of the Census gave an informal hearing to Mr. Wright and Mr. S. N. D. North with reference to the measure proposed by the former. (Senate Doc. No. 68, Fifty-fourth Congress, Second Session.) Mr. Wright spoke upon the need of census legislation at that session, the desirability of a permanent census office, the reduction of the scope of census work, and the consequent reduction of expenses. He said that "the Superintendent of the Census is entitled to three years, at least, in which to prepare for the greatest single piece of work

which our Government carries on," in order that he may "be able to see beforehand and arrange in his own mind the plans for the final tabulations and analysis, so that each step in the work of preparation forms part of a well-considered plan for the final completion of the work itself."

The Wright Bill.

The Wright bill was introduced in the House of Representatives, January 14, 1897, by Mr. Sayers (H. R. 9979), and in the Senate, January 18, by Senator Chandler (S. 3548). As introduced by Mr. Sayers (the Senate bill was not printed), it omits the sixth section, however, substituting therefor a provision that "the Twelfth Census shall be restricted to such specific topics as may be authorized by Congress."

Unsuccessful Attempt at Legislation.

On the 19th of January, Mr. Sayers introduced House Bill 10064, "To provide for the Twelfth and subsequent censuses," of the same general tenor as H. R. 9979, but devolving the work of taking the census upon the Commissioner of Labor. A very similar bill, with a few unimportant modifications, was introduced in the Senate, January 26, 1897, by Senator Chandler. (S. 3706).

All three of these bills are reproduced in the "Addendum" to Senate Document No. 68, above mentioned, where will also be found a copy of the inquiries made by the census enumerators at the Eleventh Census; a table showing the publications and the cost of each census of the United States; and the Memorial of the Committee of the American Economic Association and the American Statistical Association, praying the passage of legislation for the more effective organization of the census.

H. R. 10064 was reported by Mr. Bingham, from the Committee on appropriations to the House of Representatives, February 12, 1897, accompanied by a report (No.

2909), which was ordered to be printed. The committee "deemed it wise to consolidate the work of the Department of Labor and the census." "The Department of Labor is admirably equipped for statistical work, having a trained and experienced force, which would constitute the nucleus of the enlarged census force. Efficient preparation, which in the long run means economy, would be entered upon at once. * * The work of the Department of Labor is germane to that of the Census Office, and there seems to be no reason why the two offices should not be consolidated, thereby saving expense in organization and administration, and avoiding the necessity of establishing another independent bureau."

Nothing further was accomplished, in the way of preparation for the census, by the Fifty-fourth Congress.

The Chandler Bill.

At the first session of the Fifty-fifth Congress, Senator Chandler introduced, March 16, 1897, a bill "to provide for the Twelfth and subsequent censuses" (S. 94), which was word for word, the same as the first Sayers bill (H. R. 9979), but with the ninth section omitted. (That section directed the Secretary of the Treasury to furnish the Census Office with temporary quarters in the Washington Post-Office building.) The office was to be "at the seat of government," and neither consolidated with the Department of Labor nor attached to the Department of the Interior. The Committee on the Census, to which the bill was referred, reported May 10, that a majority of its members were "of opinion that the employees in the Census Office should be appointed according to the direction [discretion] of the Director of the Census, and not in the method provided by the civil service law and the existing rules made in pursuance thereof." The Senate amended the bill in accordance with the recommendation. The debate over the measure ran through the months of December, January and

February, and is reported in volume 31 of the Congressional Record, pages 24, 57, 159–171, 203–206, 312–319, 721–722, 756–757,—, and 1964–1977. It turned largely upon the method of making appointments, and upon the question whether the office should be an independent bureau or otherwise.

1898.

The Carter Bill.

In March, 1898, Senator Carter, Chairman of the Senate Committee on the Census, requested Mr. Porter, Mr. Wright and Mr. William A. King each to draft a bill for the taking of the Twelfth and subsequent censuses, which should embody in detail the necessary provisions in full. The comparison made between the proposed measures, and a thorough study of the questions involved, cleared the way for the introduction of a new bill (S. 4545) by Senator Carter, May 5, 1898, and on the 9th of May the consideration of S. 94 was indefinitely postponed. The debate on this bill in the Senate occupied portions of June 6, 7, and 8, and is reported in volume 31 of the Congressional Record, pages 5536–5563, 5593–5601, and 5633–5642. In advocating the passage of S. 94, Senator Carter had said that it contemplated another bill under which the permanent census work would be conducted, and that Congress reserved to itself the exclusive right to prescribe the scope of the census and the method by which it should be taken. In introducing S. 4545 as a substitute for S. 94, he said that the Senate was obviously determined to proceed directly to the consideration of the provisions requisite for the perfection of of a complete census law.

1899.

The Hopkins Bill.

In the House of Representatives Mr. Hopkins introduced, January 7, 1899, a bill "to provide for taking the Twelfth and subsequent censuses" (H. R. 11465). On the 16th of

January he introduced a second bill (H. R. 11815) with the same title, differing in no very important particular from the first. The bill was accompanied by an explanatory report (No. 1871), from which the following extract is taken: "The Senate bill provides that there shall be established in the Department of the Interior a census office, the chief officer of which shall be denominated the Director of the Census. The substitute bill presented by your Committee provides for the establishment at the seat of government of a census office, providing its duties and making it a separate and independent bureau." It was briefly discussed and passed February 6. (See Congressional Record, vol. 32, page 1512.)

The Census Act, as Passed.

The Senate discussed the measure on the 13th and 14th of February (C. R. volume 32, pages 1788–1789 and 1848), and amended it by the substitution of its own bill passed at the second session. A conference committee was appointed, with the result that the Census Office was attached to the Department of the Interior, and the independent census was defeated, although the connection between the Census Office and that Department is, under the present act, more nominal than vital. The permanent census was also defeated by the inclusion of a proviso in the second section of the act "that nothing herein contained shall be construed to establish a census bureau permanent beyond the Twelfth Census."

Delayed Action Means Inaction.

The history of this movement, as here presented, indicates the substantial growth of opinion and sentiment in favor of a permanent census; but it proves that, after the completion of the decennial census, interest in the question on the part of Congress subsides; and that the delays incident to new legislation, even on this important subject, prevents the reorganization of the office until the last possible moment, when adequate time for preparation is not allowed.

PART II.—VIEWS EXPRESSED BY THE ASSISTANT DIRECTOR AND CHIEF STATISTICIANS.

BY MR. WINES, ASSISTANT DIRECTOR OF THE CENSUS.

There is no reason to believe that the framers of the Federal Constitution, in providing for a decennial census, had in mind anything but the enumeration of the population of the United States, in order to secure a basis for equitable apportionment and representation. With the lapse of time, however, the census office has grown to be a governmental agency for the production of a periodical picture of the national resources and activities — not an exact picture in detail, like a photograph, but a rough sketch, broad in outline, yet possessing such verisimilitude as attaches to theatrical scene painting. It has been asked whether such an enlargement of the scope of the census is strictly constitutional. This question is irrelevant, since the right of the Government to collect information, statistical and other, which it may desire for its own benefit or that of the people, is unchallenged; and this right implies the correlative right to determine the method of procuring it.

Consolidation of Statistical Bureaus Impracticable.

In fact the Government maintains many scientific and statistical bureaus, and has organized the work of statistical inquiry, in some form and measure, in every department. It is unnecessary to inquire whether, and to what extent, duplication of work or an overlapping of fields of research may exist as between these departments and bureaus. It may or may not be true that, as some have contended, the consolidation of statistical work in a single office would be more efficient and economical. Such consolidation is impracticable, and if accomplished it might be found to be undesirable. The question of the division of work between existing agencies bears no necessary relation to the question whether the work committed by Congress to the Census

Office would be better done by a temporary or a permanent organization.

Congress Determines the Scope of the Census.

The office is the creature and the servant of Congress, which alone has the authority to define its powers and duties, and their limitations. The office can exercise no powers not conferred upon it, and perform no duties not prescribed by law. The Director may ask for permission, or he may suggest that he be required to undertake certain inquiries; but the granting of his requests and the adoption of his recommendations rest wholly with Congress. There can be no clashing of authority, no conflict of jurisdiction between this office and any other within the Government, unless Congress itself lays a foundation for it; and it is absolutely within the power of Congress to prevent it. It follows that the relations between this and other offices will be settled from time to time by law as occasion may require, and as the dictates of policy, economy and utility may suggest.

Dismissing, therefore, these extraneous matters from consideration, and confining our attention to the real issue, let us seek light on that.

Work of the Census Office.

The work of the Census Office consists first, in the accumulation of information; second, in the proper treatment of the material collected.

Methods of Procuring Information.

There are three methods of procuring new and original information on such topics as Congress may prescribe, namely, by the employment of enumerators, as in the census proper, by sending special agents into the field, and by correspondence. The first two are essentially one and the

same method, except that the enumerators are for the most part paid by the name or schedule, and field agents by the day. The latter are also allowed and paid their actual traveling expenses, while the former are not. In census taking the three methods are combined. Additional supplementary and illustrative information is gleaned from printed sources, but it is not new. The collation and comparison of the scattered results of other men's labors is, however, an essential element in the advancement of science, natural or social, and adds to the value of the census, if not carried to an extreme.

Necessity for a Separation of Topics.

Any reform in census methods, therefore, must begin with a division of the topics on which reports are desired. The first should include those topics concerning which information can not be secured, or not so well secured, without the aid of the enumerators in a house-to-house canvass, such as is required for counting the population. All other topics fall into the second group. The inquiries relating to the second group need not be made in the census year, and replies to the questions asked can be secured, in many instances, by simple correspondence; but if not, then by the employment of special agents in the field.

A Permanent Census the Logical Sequence.

It is precisely this reform which Congress has initiated in the present Census Act, by ordering the preparation and publication of the four principal census reports (on population, agriculture, mechanical industries, and mortality) by the 1st of July, 1902, and directing that certain other lines of special research, heretofore devolving upon the Census Office, shall be prosecuted thereafter. A permanent census office, though not established by this act, is the logical and practically inevitable outcome of the action taken by the Fifty-fifth Congress.

Retention of Trained Office Force Desirable.

The conversion of this office into a permanent bureau would favor the retention of the most capable and efficient members of the force as a skeleton organization and a nucleus for future operations. Under the system, or lack of system which has prevailed hitherto, the entire force is disbanded and scattered once in every ten years, and can never be brought together again. Each new census is taken by new men who are for the most part devoid of the special experience and training which is peculiarly important in statistical work. Mr. Horace Wadlin, Chief of the Massachusetts Bureau of Labor Statistics, has well said that "only a permanent bureau can possibly insure a trained force of expert statisticians."[1] In the hearing before the Select Committee on the Eleventh Census of the House of Representatives in March, 1892, Mr. Frank R. Williams, expert special agent for the division of manufactures, testified: "In my division up to the 1st of January (1892), I have had a total of over six hundred employees. Out of that number, after trying for weeks in some cases and months in others, to educate them up to the standard required for this work, only about one hundred and fifty clerks were found competent, while as to the others their employment was practically wasted so far as the labors of the manufactures division were concerned. I found them, if not wholly incompetent, at least not adapted to that character of work."[2] The training of clerks costs money, and the money expended upon those who, in spite of the efforts bestowed upon them, prove in the end incapable of giving satisfaction, is a total loss. They are a drag upon the efficiency of the office, and not merely do they accomplish less than they should, but much irritation is occasioned and time lost in the correction of the errors which they

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, page 60.
[2] 52d Congress, 2d Session, H. R. Report No. 2393, page 99.

make. They lower the standard of efficiency in every branch of the work. But a thoroughly trained and competent force can be secured by the present method of appointment. Such a force is the product of a process of natural selection continued for a series of years.

Continuity of Office Traditions.

The periodical discontinuance of the office occasions an interruption in what Prof. Roland P. Falkner, of the University of Pennsylvania, calls "its traditions." He observes: "A great mass of practical decisions on disputed points must continually be made in statistical work which can not be reduced to forms and regulations, and whose preservation in the memory of those engaged in the work is very essential. This is of quite as much importance as the retention of the same persons in the work."[1]

Continuity of Office Records.

It also interrupts the continuity of the records of the office. Mr. Williams, above quoted, estimated the cost of preparation of the list of manufacturing establishments in the United States, required at each census, at $25,000.[2] A much smaller expenditure would admit of keeping up this list, on the card system, from one census to another, by making the necessary corrections from time to time, and it would then be ready when wanted, instead of having to be prepared anew. This remark applies to all similar lists in use, of which there are many. Mr. Williams also pointed out that "the changed methods" adopted by succeeding superintendents of census, especially from 1810 to 1870, render satisfactory comparisons of the statistics of manufactures impracticable. "Under a permanent bureau," he remarks, "the tendency to change methods will be greatly lessened, and the results bear a corresponding increase of value."[3]

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, page 73.
[2] 52d Congress, 2d Session, H. R. Report No. 2393, page 84.
[3] Ibid., page 86.

The Census Library.

One of the most valuable auxiliaries to a properly organized statistical office is its library. On this subject Dr. August Meitzen, of Berlin, author of an important work on the History, Theory, and Technique of Statistics, wrote to Mr. Porter: "A library is necessary for such a bureau which shall contain the statistical publications of the United States and foreign countries — a collection as complete as possible. It should establish an exchange of such works with other countries." In the United States, and for the work of this office, such a library should be a depository for every state and municipal document referring to any subject of inquiry in the census. Especially valuable are documents and pamphlets relating to municipal government, finance and the work of public and private charitable and correctional institutions. The value of the collection depends upon its continuity and completeness. A library was started in the Eleventh Census, but when the office was closed, the books were more or less scattered, and in consequence of its discontinuance no effort was made to procure the serial or annual numbers of certain reports and publications, the want of which will hereafter be seriously felt.

Geographical Work of the Office.

Another branch of the work in which there should be no interruption relates to the political geography of the country. Great inconvenience and much loss of time is experienced at each decennial census on account of the lack of information respecting the boundaries of minor political civil divisions and the change in them. The Census Office should possess a complete file of the best and latest maps of states, counties and towns in this country. It is upon the geographical division that reliance must be placed for advance estimates of population, based on the popular vote at general and local elections, etc.

Time Required to Prepare for Taking the Census.

In all these and in other similar ways the work of the office suffers loss by its temporary discontinuance. These evils are most keenly felt when the time arrives for its resumption. All authorities on the subject agree that the excellence and value of statistical work depends upon the thorough preparation of the forms of inquiry and the organization of the best practical methods of securing full and truthful replies to the questions asked. Adequate preparation for a task of such magnitude demands more time than Congress has ever yet allowed for it. In the judgment of Mr. Carroll D. Wright, three full years is none too much. But the bill introduced by Mr. Garfield for taking the Ninth Census did not pass the House until April 6, 1869, and was defeated in the Senate. Its consideration and the uncertainty as to its passage delayed the preparation for the census of 1870 until after it had been disposed of. The bill for taking the Tenth Census became a law March 3, 1879. The bill for taking the Eleventh Census became a law March 1, 1889; but by a subsequent act, approved February 22, 1890, barely three months before the enumeration, Congress ordered additional questions to be inserted in the population schedules which occasioned delay in printing them, and this action greatly hindered and embarrassed the superintendent, Mr. Porter, at the outset of the inquiry.[1] The bill for taking the Twelfth Census became a law March 3, 1899. It will be noticed that in no instance has Congress allowed more than fifteen months for the preparatory work, which includes the renting and equipping of suitable quarters, the creation of an office force of 3,000 clerks, the formulation of the various inquiries, the printing and distribution of tons of schedules and other blanks, the division of the entire territory of the United States into enumeration districts, and

[1] See testimony of Carroll D. Wright, 54th Congress, 2d Session, Senate Ex. Doc. No. 68, pages 4, 5.

the selection and instruction of 300 supervisors and 50,000 enumerators. Every Superintendent of Census, beginning with General Walker, has complained of the injustice, as well as the impolicy, of imposing such a burden upon any officer of the Government. More time is needed in which to consider the use that is to be made of the material when collected, and the steps necessary in order to handle it economically and present the results in the best possible form. In view of the evident impossibility of early legislation with regard to the decennial census, the only way in which proper preparation for taking it can be insured, is to make the office permanent.

A Permanent Census Office an Economy.

It has repeatedly been said that a permanent census office would be an economy, and this is true. It may be questioned whether placing the office on a permanent basis would have the effect to decrease the total expenditure during the decennial period. It might very well happen, on the contrary, that Congress would deem it expedient to require of the office a larger amount of statistical work in the aggregate, involving a total larger outlay. But there can be no question that the results obtained would be more nearly commensurate with their cost, or in other words, that the Government would receive greater value for every dollar actually expended, and that the decennial census proper would cost less than it costs under the present system. Its scope, which is not now so large as it was in 1880 and 1890, could be still further restricted. There would be a saving of the waste due, under the present system, to the disorganization and reorganization of the office, to the want of proper and timely preparation for the enumeration, to the haste with which the selection of supervisors and enumerators has to be made, to the lack of time for properly instructing them in their duties, to the absence of thorough study

and elaboration of the census schedules, and to the necessity for the sudden selection of so large an office force, composed, for the most part, of untrained and untried men, many of whom are incompetent to discharge the duties incident to planning, supervising, and directing the work.

The sale of the furniture and fixtures of the office, valued at $150,000, at secondhand, once in ten years, is in itself no inconsiderable source of pecuniary waste.

No Time Allowed for Review.

One of the evils of the present system is that no opportunity is afforded for retrospective work. The criticism of census publications is all from the outside, and is usually severe in proportion to the delay in their appearance. What would be of far greater value is self-criticism, a deliberate review of the work, by the statistical experts employed in the office, in order to determine wherein it is defective or unprofitable, and how it can be improved, if attempted again.

Scientific and Sociological Work of the Census.

There is, besides, always a residuum of work undone, in the haste of publication, which would have been worth doing, and can still be done, if the office is not broken up. Mr. Carroll D. Wright's testimony as to this point is as follows: "There are many facts that have been collected in the present and in past censuses, that have not and can not be tabulated, but which should be tabulated. The statistics of unemployed labor in the United States were collected in 1880, but not tabulated. The information appears in the schedule. I doubt if it will be tabulated this time. All the facts relating to conjugal condition, the nativities of married and single, etc., were not tabulated in 1880. The information all lies there, and could be tabulated, and would be just as valuable now as then."[1] What he said of the

[1] 52d Congress, 2d Session, H. R. Report No. 2393, page 88.

Tenth Census is equally true of every census. Three principle uses are made of the material collected, namely, political, economic, and sociological. They are here named in the order of their vital and immediate interest. The primary and constitutional purpose of the census is to afford the necessary basis for the appointment of political representation. It fulfills a subordinate, but important function, in the collection of exact, fresh, and recent information as to the fluctuations in the material and economic conditions which affect agriculture, manufactures, and commerce. This information, which is demanded by the business interests, is also of value in its relation to taxation, and as a guide to intelligent and effective legislation on social and economic problems. These are the two most pressing, urgent demands upon the office, and its credit with the people depends upon the promptness with which they are met. But, in the interest of science, the further demand is made that the facts collected shall be compelled to yield whatever they contain which may contribute to our knowledge of the constitution, organization, and social activities and relations of society as a whole, and of the various elements of which it is composed. This is a branch of the investigation which needs to be more deliberate, and which requires the arrangement of data in a multitude of relations more or less tentative. In a word, the Census Office should be a sociological laboratory, in which statistical material is exhaustively analyzed and properly classified, and conclusions are carefully weighed and tested before they are announced. This strictly sociological work might very well be postponed until the reports for political and financial consumption are out of the way.

Work Not Done.

By the way of illustration of the point just made, extracts from some of the letters addressed to Mr. Porter in 1891 may here be quoted.

Mr. H. S. Pritchett, formerly at the head of the United States Coast Survey, and now President of the Massachusetts Institute of Technology, writes: "Our statistics of population would be immensely more valuable, if we knew the fluctuations of value from decade to decade. This knowledge could be gathered by a permanent census bureau, and only in this way can the accuracy of the statistical work be checked, and the elements of the population be classified. A striking illustration of the value of such work is found in the use which the English Government has made, in the recent Bering Sea controversy, of the results of compilations by the English Census Office. * * The organization maintained by many of the European States for collecting constant official records of the fluctuations of population could be studied with advantage."[1]

Mr. Edward Atkinson writes: "To my mind the most necessary department yet remaining to be set at work to its full measure of usefulness is a *Department of Relative Statistics*, by which the relative conditions of the different states of this Union, and of this Union as compared to other countries, may be shown. * * I should expect one of the first developments of a permanent census bureau to be the establishment of a science of the comparative statistics of nations, than which nothing could be more important as a basis for intelligent legislation."[2] Mr. Atkinson, in the letter quoted, employs the felicitous phrase, "natural history of industry," to express a result which he thinks a permanent census office might attain, by intelligent and persistent study of the progressive diminution of profits and increase of wages, with the progress of invention, in every specific mechanical art of considerable importance.

Dr. William T. Harris, United States Commissioner of Education, writes: "The census, with its limited period of

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, page 82.
[2] Ibid., page 68.

action, has never been able to collect a most valuable kind of material, regarding the social development in cities, and with regard to the bulk of wealth in the whole country. There are political and social questions which affect politics and legislation — the Henry George question, for example; the Bellamy socialism, as another example. All these rest upon a supposed law which Karl Marx announced many years ago, when he was still living in England, namely, that the rich are growing richer and the poor are growing poorer, and the middle class is disappearing among the poor. On the strength of this law he arraigned our industrial civilization. The actual statistics kept in England by means of the income tax show that the contrary law is in action there, namely, that the middle class is ascending rapidly into the rich class, and the poor class is ascending with equal rapidity into the middle class. Such statistics in the United States would be of immense value to all our statesmen and politicians. But it is evident that the census bureau, with the limited means at its disposal and its short term of existence, can not obtain such important facts, nor can it train the specialists who can handle such questions." [1]

Mr. B. C. Keeler, of St. Louis, writes: "Tons and tons of reports have been printed showing the production of wealth in this country, but next to nothing to show its distribution." [2]

Mr. Thomas G. Shearman, of New York, writes: "The census of 1880 produced an enormous mass of statistics relating to manufactures, which have ever since been practically useless to students of the subject without a large number of difficult and time-consuming calculations which ought to have been made by the bureau itself. * * To be more specific, the tables of wages, cost of materials, etc., are practically useless without supplementary calculations. * *

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, page 77.
[2] Ibid., page 76.

Many such calculations have been made, but they are all prepared by private individuals. * * It should all have been done for them by the census bureau, once for all." [1]

Mr. Wright, in his testimony, January 9, 1897, referred to the well-known fact that "the lines of criminal statistics vary as the condition of industry varies," and said that a permanent census "would enable us to reach some kind of a conclusion as to the effect which industrial depression has upon crime."

The Smithsonian Institution: An Illustration.

Illustrations of this general character might be indefinitely multiplied and brought down to date. The field of scientific investigation, from a sociological view, is practically limitless. It includes not only the composition of the social whole, and its internal relations (marriage, divorce, births, deaths, occupation and employment, etc., by elements of the population, sex, age, and the like), but the relations of man and nature; for example, his relation to the soil (farm tenure, the ownership of land, taxation, etc.), to different forms of productive labor, etc., etc. A decennial census takes too disproportionate a survey of static relations; for the proper study of dynamic social relations, more frequent observations are essential. The growth of the nation can not be thoroughly understood unless it is studied analytically, element by element, by men who give their lives to its consideration. There are, too, numberless obscure but vital interrelations between facts gathered in different fields of inquiry which, to a casual observer, seem disconnected. Sufficient attention has not been given to their coördination. The advance of the physical sciences during the past century has been greatly stimulated and promoted by the work of the Smithsonian Institution. A permanent census office, if organized on somewhat the same general lines, with equal

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, pages 77-78.

freedom to select subjects for original research, to adopt methods of investigation and to call to its aid the highest talent and the best thought in the United States, regardless of its official connection with the Government, might render signal service in the development, during the next hundred years, of the social sciences. This is the true ideal of permanent census work. The census office should, in point of elevation of standards and the intellectual power of those responsible for its direction, rank with the first universities of Europe or America.

Centralization of Statistical Work.

Prof. Richmond Mayo-Smith, of Columbia University, in an article printed in the *Political Science Quarterly*, Volume XI, No. 4, has discussed the question of "centralization" or "decentralization" of statistical work. Under our political system, with its wide distribution of jurisdiction among states, counties, cities, and towns, and with the vast private initiative which characterizes American life, the data upon whose collection and incorporation into one homogeneous whole all sound statistical generalization and scientific deduction depends, are so fragmentary and scattered, that the need of centralization of statistical inquiry is sorely felt. Such centralization can only be effected by the National Government, and the Government itself is powerless to accomplish this result without the intervention of a central bureau, thoroughly scientific in its character and methods. The census office could be made such a bureau. Professor Seligman, of Columbia University, has even said that "it is the opinion of all economists that we can not hope for thoroughly trustworthy and really useful statistics in this country until we have a permanent bureau."[1] One reason for this belief is indicated by Mr. F. B. Sanborn, of Concord, Mass., who says: "We have as yet no bureaus

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, page 80.

which require the local officials to keep records of statistical exactness. * * What is needed most is to teach the myriads of persons who, from different parts of the country, report the existing facts, that records must be carefully kept and statements exactly made. Experience has shown me that the best school for such accuracy, among the original collectors of information, is the existence and persistent requirement of periodical returns, occurring so frequently that the errors and merits of each successive return can be readily shown to the persons who take them, without exciting too much resentment, despair or confusion in the minds of such persons. * * I should look to a permanent census bureau as one step toward supplying this defect of exact knowledge to these eager persons who have no defect of the generalizing faculty, except knowing how and where to apply it."[1]

In addition to what Mr. Sanborn has said, emphasis should be laid on the importance of uniform methods, without which statistical returns collected from different sources at different times can not be consolidated and compared. This end could be promoted by maintaining intimate and uninterrupted relations between a centralized bureau and the various private and public organizations from which it gathers information. But such relations are impossible, unless the central bureau is permanent.

The Philippine Census.

The suggestion need scarcely be made that, in 1910, if not at an earlier date, a census will have to be taken of the Philippine Islands, for which special preparation will be necessary, and this preparation, in order to be thorough and effective, will require a much longer period than Congress is accustomed to allow for this purpose.

[1] 52d Congress, 1st Session, Senate Ex. Doc. No. 1, page 81.

BY MR. WILLCOX, CHIEF STATISTICIAN FOR METHODS AND RESULTS.

The century just closing has been recently called by Sir Robert Giffen "the statistical century *par excellence*," and rightly so, for almost the entire development of statistics has occurred within the nineteenth century. In 1800 no country possessed organized statistics in agriculture, manufactures, or vital statistics, and no country except the United States had made provision for a periodic count of its population. By 1900 nearly all the great civilized countries had made provision for recurrent investigations into these sides of national life and activity, and in this striking development the United States have taken a conspicuous and honorable part. The rise and growth of census work, in all civilized countries, during the nineteenth century, warrant the belief that the growth should and would continue. It has been attended in the past, and doubtless will be attended in the future, by the development of statistical bureaus, offices, or departments requiring a body of men trained to administer or superintend their details. In response to this need, a body of expert or professional statisticians has sprung up, whose services to the Government increase in value with their growing experience.

Congress recognizes this class of experts and their value to the Government, by requiring, in the present census law, that the Assistant Director "shall be an experienced, practical statistician," and that the five chief statisticians "shall be persons of known and tried experience in statistical work." If the persons secured to fill these places regularly lose their positions when their maximum efficiency is reached, Congress will be unable to secure the full benefit of the experience demanded by these provisions of the law. To support this conclusion, appeal may be made to the history of American census work during the last half century.

In 1850 Mr. Kennedy was made superintending clerk of the census. He was succeeded in 1853 by Mr. De Bow,

who finally retired in 1855. In 1858 Mr. Kennedy was again appointed to prepare a digest of manufactures for the Seventh Census, and from 1860 to 1865 he was superintending clerk of the Eighth Census. In 1870 Mr. Walker was appointed superintending clerk of the Ninth Census. After holding the position for twenty-one months, he was for fourteen months Commissioner of Indian Affairs, and then accepted a position in Yale University. But for seven years he continued, without salary, to direct the work of the Ninth Census, so far as compatible with his other duties. In 1879, he was appointed Superintendent of the Tenth Census, retiring in a little more than two years. Then Mr. Seaton was appointed, and held the office for three years. In 1889, Mr. Porter was made Superintendent of Census and served for four years; then Mr. Wright was appointed, and served for four years, completing the work of the Eleventh Census. The six persons who were at the head of United States census work between 1850 and 1899 served on an average five and two-third years; or, if one disregards the seven years when Mr. Walker was in private life and away from Washington, but still retained some connection with the office, then they served on an average four and one-half years.

What has been true of the heads of the Census Office, has been true of the leading subordinates. The present law requires that six of the Director's subordinates should be experienced statisticians, but men of the necessary caliber can not always be persuaded to accept temporary positions at the salary provided by Congress. Two of the six positions had to be filled by persons who retained their hold at the same time upon permanent positions, and who are likely to withdraw, just as their experience becomes most ripe. Of the five chiefs of division (the immediate subordinates of the chief statisticians) two resigned in less than two years after their appointment to accept permanent positions else-

where; the other important officers, out of loyalty to the work, and after some pressure, have declined invitations to better themselves through resignation. Such frequent changes in the high officials give a feeling of restlessness and uncertainty to the whole office, and injure its efficiency. In an office charged with expending Government funds to the extent of $1,500,000 a year on an average, and $9,000,000 a year as a maximum, it seems extravagant and wasteful deliberately to throw away the experience of the directing heads after the Government has bought and paid dearly for it.

To learn whether other countries, in filling similar positions, appreciate that need of experience which Congress emphasized in the present census law, I have selected the seven statisticians, in as many foreign countries, who have been most conspicuously identified with census work during the last half century, and have examined their tenure of office. The names selected were: In Austria, Karl Theodor von Inama-Sternegg; in England and Wales, William Farr; in the German Empire, Karl Becker; in Hungary, Karl Keleti; in Italy, Luigi Bodio; in Prussia, Ernst Engel; and in Russia, Nicholas Troinitsky. The information regarding France I could not find.

Of these seven men, four have died; the other three are still in office. None of them has served for a shorter time than sixteen years, and William Farr held an important statistical position for forty-two years. The average length of these men's connection with census and other statistical work, in their respective countries, has been twenty-four years, or many times as long as the average tenure among high officials in the American census office.

The history and present condition of the United States Census Office show that, where the tenure of the high officials is brief and uncertain, the office is debarred from utilizing properly its own accumulated experience — an ex-

perience that, with the growing complexity of the work, becomes steadily more necessary; and this lesson from our own history is supported by the uniform experience of other great countries.

In pushing to completion the inquiries provided for in section 7 of the census law, the office has its own field agents, and through them comes into direct contact with the people. But when it reaches the inquiries provided for in section 8, it can no longer rely upon the enumerators, and in many subjects must seek the co-operation of various state, county, city, or private organizations. For example, in collecting statistics relating to "the insane, feeble-minded, deaf, dumb and blind," the office must lean heavily upon the state commissioners of lunacy. In collecting statistics upon "crime, pauperism, and benevolence, including prisoners, paupers, juvenile delinquents and inmates of benevolent and reformatory institutions," it must lean upon the state judicial authorities, state prison commissioners, and state commissioners of charities. In reporting upon "deaths and births in registration areas," it must enlist the co-operation of the various state boards of health and registration offices. In reporting upon the "social statistics of cities," it must seek co-operation with a great number of municipal officers. In reporting upon "public indebtedness, valuation, taxation, and expenditures," it must ask help of state, county, and city financial officers. In reporting upon "religious bodies," it must depend upon the diverse religious organizations.

In all these fields of action, the Census Office has, and can have, no authority conferred upon it by law. The co-operation of state, county, or city offices, or of private organizations, must be voluntary, and it can be secured only by building up cordial relations with them, and proving to their satisfaction that the benefits they will receive from the work of the Census Office will compensate them for the labor of correspondence, and of making reports in

the form and to the extent requested. That such co-operation between a national office and state municipal officers may be developed is proved by the relation of the United States Department of Agriculture to the various state departments of agriculture; of the Bureau of Education to the various state educational systems; of the United States Geological Survey to the various state geological surveys; of the United States Weather Bureau to the various state weather bureaus; of the National Department of Labor to the various state bureaus of labor, or similar offices; of the Commission of Fish and Fisheries to the various state fish commissions. Other instances might be cited.

Effective co-operation of this sort depends upon securing in the central office a thorough knowledge of the conditions under which the various state or local offices are working, of the difficulties they have to encounter, and of what it would be reasonable to ask of them. It depends also upon fostering in these various local offices a readiness to co-operate, and a recognition of the fact that the Census Office desires only to subserve their interests and extend their influence. For the proper development of the inquiries provided for in section 8 (and it may be noted that other inquiries of a similar character may frequently be ordered by Congress), the organization of the census bureau on a more permanent basis seems to me indispensable.

The main public reasons, then, for desiring a permanent census office are, in my judgment, these two:

(1) Only through a permanent office can the Government and the country profit adequately by the experience of the organizing and directing heads.

(2) Only through a permanent census office can the necessary system of voluntary co-operation with state, county, and city offices and private organizations be developed and maintained.

BY MR. HUNT, CHIEF STATISTICIAN FOR POPULATION.

The act governing the taking of the Twelfth Census stipulated that the work at the decennial period of enumeration should be restricted to inquiries relating to four subjects only, namely, population, agriculture, manufactures, and vital statistics, but authorized the collection at a later period of statistics pertaining to certain special subjects of census investigation. This division of the census work was the result of the experiences of the Tenth and Eleventh censuses, at which the completion of many of the volumes of the census reports was much delayed, owing (1) to the inability of the office, from the administrative standpoint principally, to handle so many different kinds of work at one time; (2) to the difficulty in securing the necessary clerical force and building space of the right kind for the prosecution of fifteen or twenty distinct investigations when, as a necessary requirement of the work, a maximum force is needed in each case at practically the same time, if the reports resulting therefrom are to be made ready for printing without material delay; (3) the inevitable block in the printing office all along the line, from the very beginning of the work relating to the different inquiries to the completion of the several reports themselves; all of which helped to produce conditions which resulted in unavoidable delays in the prosecution of the different branches of the work and prevented the completion of the census volumes within a reasonable length of time.

So far as the general decennial work of the Twelfth Census is concerned, this division over the ten-year period of what has come to be considered as legitimate census work did not lessen, as a matter of fact, the amount of preparatory work necessary to the enumeration of the population and the prompt tabulation of the enumerators' returns, in order that the count of population for apportionment purposes might be made ready for the use of Congress at the

beginning of the session in December immediately following the date of enumeration. This statement is equally true with respect to the work carried on in the manufactures and agricultural divisions, and, to a very considerable extent, to that in the division of vital statistics. It did, however, enable the office to concentrate its energies in the prosecution of these four branches of census work only, and to that extent is a very great improvement over the condition of affairs at the last two censuses preceding.

In addition to the enumeration of the population of the states and organized territories of the United States proper, specific provision was made by the Census Act for the enumeration of the population of the Alaska and Hawaii, and, by implication, also of the population of the Indian Territory and Indian reservations, areas not heretofore comprehended by the work of the general census enumerators. In the prosecution of the work relating to population thus laid down by the Census Act, the force under my direction was busily employed for something more than a year, dating from my appointment on March 25, 1899, in making, or assisting in making, necessary preparations for the enumeration to be carried on during the month of June, 1900. This preparatory work comprehended (1) the division of the territory to be canvassed into 300 supervisors' districts and their subdivision into more than 50,000 enumeration districts; (2) the preparation of the schedules, blanks, and miscellaneous supplies needed by the supervisors and general census enumerators in their work, including a practical test of the applicants for appointment as census enumerators; (3) the enumeration of the population of the larger institutions of the country by the appointment of special "institution" enumerators; (4) the enumeration of the population of the military and naval stations at home and abroad through the agencies of the War and Navy Departments; (5) the enumeration of the population of the Indian Territory and of the

Indian reservations in co-operation with the Commissioner of Indian Affairs; (6) the provision for a much closer supervision than heretofore of the enumeration of the population of the larger cities of the country, by the employment of special agents to assist the supervisors in the cities and by the use of the streetbook, individual census slips and "absent family" schedules to supplement the ordinary work of enumeration; and (7) the shipment of schedules and supplies to the supervisors and enumerators.

Concurrent with these preparations relating to the enumeration work, the preliminary steps had to be taken to provide for the organization, equipment, and instruction of the large force of employees to be used in receiving, examining, and compiling the enumerators' returns, and, as a necessary adjunct thereto, in the certification of the enumerators' accounts for settlement by the disbursing office. This preliminary work comprehended (1) an examination of the records of the Eleventh Census, so far as they were available, for the purpose of obtaining a basis for estimating the time in which the work of the present census could be completed and the approximate number of people that would be needed for its prosecution; (2) the testing of the several tabulating devices submitted in accordance with the requirements of the Census Act, and, upon the acceptance of the Hollerith system of electric tabulation, in providing for securing the necessary number of individual and family punch cards printed in accordance with the classifications required for the work, wooden boxes properly equipped for storing the cards, keyboard punching machines, schedule holders, gang punches, and electrical tabulating machines; (3) the equipment of the space in the Census Office building set apart for the population work, in the way of providing proper shelving for the cards and schedules, in dividing the rooms into sections and subsections for the proper conduct of the work, in the letting of the contracts

for the building of the tables, chairs, and other necessary furniture for the use of the clerks, and in providing for the proper disposal of the outer clothing of the large force of employees; and (4) in the preparation of the instructions, result slips, and other blanks needed in the several branches of the population work.

It is easy to thus briefly summarize the preparatory and preliminary work incident to the enumeration of population and the tabulation of the completed returns, but it is difficult, without great elaboration, to indicate the amount of labor involved and of energy expended in a comparatively limited period, in order that the enumerators should be fully equipped to begin their work promptly on the morning of the 1st of June, 1900, and to have a sufficient force of employees in readiness to handle the completed schedules as soon as received. Some idea of the comprehensiveness of this work can be gathered, perhaps, from a brief statement of the number and gross amount of schedules and other blanks printed for the use of supervisors and enumerators, a work which was largely carried on under my direction, although comprehending, to a greater or less extent, the work of other divisions of the office.

For the purpose of obtaining the information relating to population, agriculture, manufactures, and mortality, as required by the Census Act, it was necessary to prepare and print upward of 60 different schedules (or forms of schedules), representing in the aggregate over 12,000,000 copies; that is to say, besides the 4 general schedules, of which in the aggregate 10,400,000 copies were printed, there were 41 special schedules relating to the different manufacturing industries, 9 special schedules relating to the different branches of agriculture, and separate special schedules for the enumeration of the Indian population, of persons in the military and naval service of the United States at home and abroad, of persons defective in sight,

hearing, and speech, of inmates of penal and reformatory institutions, and of live stock not on farms and ranges, these special forms of schedules representing an aggregate of more than 1,500,000 copies. In addition to the 60 general and special forms of schedules used in whole or in part by the census enumerators, something like 125 different blanks and forms had to be prepared, and of these more than 15,000,000 copies had to be printed, for use in connection with the work of enumeration. This means, therefore, that it was necessary to print for the purposes of the general enumeration upward of 26,000,000 copies of schedules and blanks; and, besides these, a complete set of schedules and blanks was needed in each case for the enumeration of the population of Alaska and of Hawaii, amounting in the aggregate to more than 50,000 copies for each, which were prepared, printed, and shipped in May and October, respectively, of the year 1899, in order that the work in these two territories could be carried on as nearly simultaneously as possible with the work of enumeration in the United States proper.

The schedules and blanks used by the census enumerators were not shipped in bulk to the supervisors, as was the case at the Eleventh Census, but a sufficient number of the several schedules and blanks was enclosed in a separate portfolio for each enumeration district, and these portfolios, of which there were more than 50,000, were forwarded to the supervisors, in large wooden boxes, to the number of approximately 4,500, for distribution by them to the enumerators of their respective districts. This involved a great amount of labor and required a comparatively large force of employees, but it simplified very greatly the work of the supervisors who, usually speaking, do not have the proper facilities nor a sufficient number of clerical assistants to handle a great mass of schedules and other blanks and make the necessary separations for the use of individual enumerators, requiring

different numbers of schedules and blanks according to the character of their respective districts.

Similarly, in preparing for the work to be carried on by the large force of employees in the compilation of the population returns and the proper accommodations thereof, it was necessary to provide for the purchase and printing of about 90,000,000 individual cards and 18,000,000 family cards; for the making of 68,000 boxes for storing the cards; for the purchase of 575 new keyboard punching machines and the repairing of 645 old keyboard and gang punching machines; for the making of 1,100 schedule holders; for the employment, under contract, of something like 150 tabulating machines; and for the purchase of 2,500 chairs of special pattern and of 462 large tables, accommodating, in each case, two or three persons, for use in the several subsections of the punching and other machine work.

In the early stages of the preparatory work a limited force only was needed, but as this work progressed the force was increased from time to time, so that in the middle of May, 1900, there was upward of 160 persons engaged under my direction in the preparatory work incident to the enumeration. In accordance with my estimate of April 3, 1900, provision had been made, however, for the assignment of a certain number of active, energetic, and intelligent young men daily, beginning with May 16, and the assignment of a certain number of women daily, beginning June 1, 1900, in order that they might become somewhat familiar with the work before the receipt of the enumerators' returns, when their services would be required in the work of actual tabulation, or work incident thereto. This estimate, representing the employment of something more than 1,800 clerks for a period of about six months following the close of the enumeration on June 30, 1900, was based upon estimates derived from the experience of the Eleventh Census, this large force being required in the early stages of the

work of tabulation in order to provide the number of people needed primarily in receiving, examining, freeing, and delivering the schedules to the several divisions charged with their compilation, in checking and certifying for payment more than 53,000 enumerators' accounts, and in carrying on all the various processes of the population work necessary to the completion of the count of population for apportionment purposes prior to the assembling of Congress in December. Beginning with the middle of May, a force of 300 men was taken on at the rate of 10 daily, and the remainder of the force, comprising mainly women, was taken on at the rate of about 40 a day from June 1 until July 25, when the total force of the division numbered 1,807 people; but this number was subsequently increased by the exigencies of the work to a maximum of 1,960 on October 10, 1900.

The legislation providing for the work of the Twelfth Census was not effected until March 3, 1899, or not much more than a year prior to the date set for the enumeration, that is, no greater length of time than was permitted for the work in connection with the Tenth and Eleventh censuses. It is apparent from the foregoing synopsis of the work relating to population at the present census that a year is not a sufficient length of time in which to make proper and adequate preparation for the enumeration and, at the same time, for the organization and equipment of the large force needed for the execution of the work of tabulation. It is manifestly true also that, in spite of the anticipatory employment of a good share of the force in order that they might become more or less familiar with their duties before the actual work of tabulation commenced, a force of very nearly 2,000 persons can not be trained sufficiently in so short a time to do the work required with accuracy and precision, and this is more apparent when it is considered that the number of experienced persons available for the work of supervision and instruction is necessarily limited under the

existing conditions of the census organization. Of the 1,960 persons who were employed in the population division, October 10, 1900, only 119, or barely 6 per cent, had been identified with the work of the Eleventh Census, and of this small number less than 20, or barely one-fifth, had previously had sufficient training in census work to have their services utilized in a supervisory capacity. The paucity of available material for the work of supervision under our temporary census organization is more fully emphasized when it is considered that the small number of experienced persons who could be utilized in supervising the work of my force represented less than 14 per cent of the total number of persons required in the work of supervision when the force as a whole numbered 1,960 persons. In spite of these conditions, however, the work accomplished by a practically untried force, numbering very nearly 2,000 persons, is worthy of mention, and in this connection I can do no better than to repeat what I said to the Director in my letter of March 21, 1900, touching the efficiency of the Twelfth Census force, which had been employed under my direction.

The amount of work accomplished by this force under such conditions of organization may be briefly summarized. The first returns from the census enumerators were received on June 13, and a few days later the work of examining the schedules was begun for the twofold purpose of verifying the statements made on the enumerators' pay vouchers, so that they could be passed forward for settlement without unnecessary delay, and of preparing the population returns so that the work of punching a card for each person enumerated and the subsequent tabulation thereof on the electrical machines could be pushed to completion at the very earliest date possible. The examination of the schedules, so far as it affected the settlement of the enumerators' accounts (exclusive of the returns for Alaska and Hawaii and for the military and naval population), was substantially completed on August 31, when 45,300 out of a total of 53,400 accounts (not necessarily enumeration districts), had been sent forward for payment, the remaining accounts being temporarily

withheld for certain corrections in the returns for agriculture and manufactures; but practically all these accounts were released for payment by the close of the month of September. The work of preparing the schedules for punching was carried along in conjunction with the actual work of punching the cards, which was commenced with 25 operators on June 18 and increased from day to day, until 915 operators had been assigned by July 25, and upward of 1,000 operators were employed daily after the middle of August until its completion the latter part of October. The work of keyboard punching, as it is termed, was completed on October 26, and the work of machine tabulation on October 27, representing the punching and counting of over 76,000,000 cards within a period of a little more than four months from the date of the receipt of the first returns from the census enumerators. As a result of this work a preliminary statement of the population by states and territories was made public on October 30, and the verified statement, to be used as a basis for the apportionment, was promulgated one month later, or on November 27, 1900.

Following the completion of the work incident to the announcement of the count of population for apportionment purposes, as above summarized, it was necessary to punch something like 15,000,000 family cards, from which are derived the statistics of dwellings and families, the ownership of farms and homes, and other related data, in addition to the 76,300,000 cards from which are derived the purely individual data, in order to produce the statistical data covered by the Report of Population and representing, approximately, 2,000 pages of tabular matter and 400 pages of introductory and textual matter, and thereafter to handle these punch cards (individual and family) in whole or in part 10 different times. This number of different handlings represents a single handling of upward of 450,000,000 cards, that is, eqivalent to the passing of that number of cards once through the electrical tabulating machines. Of the work of purely machine tabulation very nearly 84 per cent has been completed to date, and the present condition of my work is

such that not only will Part I of my report be issued during the month of December, but there is every assurance now that Part II can be published on or before July 1, 1902, or within the time specified by the Census Act.

It is well recognized that the value of statistics depends largely upon the speed with which they are collected and compiled and, therefore, made available for the uses for which the original inquiry was instituted, but it is manifest that no success in this direction can be achieved in census work, as now regulated, without an undue, and to a very considerable extent unnecessary, strain upon the energies of the responsible heads of the several branches and the forcing of the entire clerical force, to the imminent danger of committing serious errors, of omitting important data which, in the rush of preparation and tabulation, are apt to be overlooked until it is too late to remedy the error or omission without delaying the completion of the work as a whole. It is apparent, furthermore, that sufficient time is not permitted for the exercise of a proper amount of thought and care in providing for the multitudinous details of the work incident to the enumeration of a large population and its proper compilation, and the burden of responsibility which is concentrated upon a relatively small number of experienced persons is likely to become too great sooner or later, if provision is not made for the maintenance of a permanent census organization and the retention at least of a nucleus force of trained experts and experienced clerks and employees at all times.

As long as the office remains on a purely temporary basis, moreover, there is another important consideration to be borne in mind, and that is the uncertain tenure of employees, making it almost imperative after the first rush of the census work is over for trained employees to seek other employment because there is no future in the census work. This is already beginning to be apparent at the present cen-

sus, and as we near the completion of the two-year limit of work we are likely to lose the services of very many valuable employees on this account. It is absolutely essential to the successful conduct of the next decennial enumeration that the nucleus organization of this division be kept intact, as nearly as may be, as the enumeration of 1910 of very nearly 100,000,000 inhabitants will require the services of every trained employee that can be made available.

There will be plenty of work for this nucleus force to do in the prosecution of the work required by the special subjects of investigation, which under the law are to be taken up upon the completion of the general reports, as well as in the completion of the data contained on the individual and family cards which are of somewhat special signification and which could not and need not under the law be included in the general report on population; and it may also seem desirable at a little later period to consider under a permanent organization the desirability of more frequent enumeration or investigation along the lines of that which has come to be considered an essential part of the purely decennial work. It is necessary, also, that some part of my force should be kept intact, in its responsible capacity, at least, in order that, immediately upon the completion of the general work in 1902, the records of that portion of the work of the Twelfth Census may be brought to a proper conclusion at an early date, so that they may be available for use in suggesting the legislation essential to the prosecution under proper conditions of the next general or partial enumeration at whatever date it may be ordered.

BY MR. NORTH, CHIEF STATISTICIAN FOR MANUFACTURES.

1. The work of the division of manufactures is extremely complicated and technical. It requires the service of clerks not only carefully trained in statistical methods, but familiar with the business and details of manufacturing in many lines of industry. Properly trained clerks to take charge of the

different branches of the work of the division are hard to find. In the present census we have been obliged to train most of these clerks from the raw material. Notwithstanding the readiness of the Director to appoint experienced clerks of the last census, whose services I desired and could obtain, I was not able to secure more than four, including the chief of division, who had served in the Eleventh Census and there demonstrated their capacity to direct the work of others. The remainder have come to the front through the direction of the law of the survival of the fittest; and as the work draws to a close they are becoming competent to properly handle it.

With the breaking up of the office these clerks will disappear; the qualities they have here displayed will win for them desirable positions in private life; and at the opening of the next census the office can command the services of no more of them than were available in 1900. The kindergarten business will then begin again. It is an expensive business for the Government, involving loss of time and energy, and sometimes consequences far more serious. If the office were permanent, many of the specially skilled and peculiarly qualified clerks would consent to remain in a service that offered a permanent career. They would be profitably employed on the intervening work, and at the commencement of the Thirteenth Census the nucleus of the division of manufactures would be already organized at the highest point of efficiency. In this respect the work would begin where we shall leave off, and it would be correspondingly better done at each of its several stages.

2. Another distinct and important advantage would spring at once from the existence of this nucleus of trained clerks. It would enable the office substantially to dispense with the services of the expert special agents, upon whom it has been compelled to rely in the last three censuses.

It is not possible to make a scientific and satisfactory report upon the growth and development of great and complicated manufactures — like that of iron and steel, for instance — without the assistance of experts thoroughly familiar with the industry, and capable of co-ordinating its statistics with a knowledge of their true significance. For the Twelfth Census we have utilized the services of some sixteen experts in as many special industries — men who are employed in other walks of life, and whose services to the Census Office have been in addition to their regular occupation, and who have been obliged, therefore, to perform their census duties at their own places of residence, with a small body of clerks detailed, in each case, to assist them. The compensation allowed special agents is not sufficient to enable the Census Office to command the entire time of properly trained experts of this character; hence the necessity of this wide scattering of the work, and the maintaining of different offices in various parts of the country, at a great increase in its cost. Up to the 1st of October, the cost of expert service, including clerks, rent, etc., was $87,694.71.

With a permanent census office, the service of expert special agents could be substantially, if not altogether, dispensed with; for they would be required, if at all, only for a brief interval at the beginning, to assist in formulating schedules in keeping with the latest development of the industries, and at the end to prepare the text to accompany the statistics, after they had been collected, tabulated, and placed in form for final publication. Even this brief outside assistance could be dispensed with in most industries; for, with a permanent office, there would develop in the division a number of clerks trained to a thorough understanding of the technical details and intricacies of the industries specially treated who could severally take charge of the statistics of these industries in the census office itself, with full knowledge of census methods and requirements. A perma-

nent census office would have its own experts in every line of inquiry; a temporary census office never can have them.

The cost of maintaining the expert agents and their independent offices would thus be dispensed with, and at the same time the work would be more efficiently and satisfactorily done. Difficulty arises in dealing with the expert agents, by reason of the fact that they are not themselves as a rule trained in census methods, and are not always amenable to census discipline. The gain to the office and to the work as a whole, along the lines indicated above, would be sufficient, in and of itself, to justify the establishment of a permanent census office, so far as the division of manufactures is concerned.

3. With a permanent census office the original canvass, or field work, could be greatly improved. The weakest spot in the census work is, and in the nature of things always must be, the field work, which is the substructure of the whole census. The work of the enumerators in returning the manufacturing schedule was pronounced by Superintendent Porter to be "practically worthless." While that was a very sweeping condemnation, I regret to be obliged to say that, at the Twelfth Census, the enumerators' work on this schedule has not shown any marked improvement over that of ten years ago.

It follows that the canvass of the manufactures of the country must be assigned more and more to special agents, eliminating the enumerators except in remote rural districts. But not even the special agents can be depended upon for accurate and satisfactory work. They are, as a rule, men without training in gathering statistics, and the number of blunders made by special agents in filling the manufactures schedule of 1900 was in the hundreds of thousands.

To improve the quality of the field work the Twelfth Census inaugurated a plan of instruction and inspection, the good results of which are everywhere apparent. A dozen

or more trained men were kept in the field during the canvass, traveling from city to city, to instruct the field agents, to call attention to errors, and generally to expedite and improve the work.

The success of this method of inspection and instruction was so marked as to make it certain that no manufacturing census will ever again be taken without this direct supervision of the field work. In 1900 we were so fortunate as to obtain a dozen thoroughly trained field agents, through the courtesy of Carroll D. Wright, Commissioner of Labor, who was able to spare the number from among his field agents for temporary census service during the four months of the canvass. But for this good fortune the plan of field inspection would have failed for lack of properly trained experts. With a permanent census office, its regular complement of clerks would always be available for this supervisory field work, as there is no service in connection with the census of manufactures where their work would be more effective.

4. With a permanent census office, there would be preserved the traditions and the records of previous censuses. It is not possible to exaggerate the importance of this advantage or the evils which result from its absence. One great purpose of a census of manufactures is to create a *measure of industrial growth*; and the value of that measure must depend, in a very large degree, upon the scientific accuracy of the comparison between censuses. As industry becomes better organized, as the utility of statistics becomes better understood, as the possibilities of securing exact data increase, so does the importance of uniformity in methods and in results increase. So long as the census office is decennially abandoned and reorganized, this feature of uniformity — the first essential in scientific census work — is impossible of attainment. With each breaking up of the office, the *tra-*

ditions are scattered to the four winds. The "hows" and "whys" of everything, of every step, of every process, which become ingrained in the *personnel* of an office, which spread through all its rank and file, which descend from man to man, and, so to speak, make the office atmosphere, are destroyed; and thus is lost the most valuable accumulation — next after the tangible results, in every great work — the combined and commingled and aggregated *experience* of those who have been engaged in it.

With the experience, go also the records; at least such has been the case in the past. At neither the Tenth, Eleventh, nor Twelfth censuses were there any records available, except in isolated instances, in the work of the manufactures division. What we did get from the last census, was in such condition, after storage in careless hands, so mutilated, disarranged and inextricably disordered, that the material was practically useless. Thus the division had to be reorganized *de novo*. The traditions were gone, the records were lost, or preserved in inextricable confusion, and we must needs grope our way, from step to step, and stage to stage, not always sure of the right methods until we had tried several, and without any advantage of the previous experience of the division in the trial of those methods; without definite certainty at many points as to whether we were preserving sufficiently the methods of treatment previously adopted as to preserve the comparability of one census with another. As a matter of fact — and more strictly, perhaps, in the division of manufactures than anywhere else — exact and scientific comparability of the statistics exists at very few points, and, in the nature of things, can not exist so long as the division is torn up by the roots at the close of each census, to be built up again at a later date by a body of officials who must in most cases be new men, unfamiliar with the past.

Some illustrations of the lack of uniformity in the methods of the office — traceable in nearly every instance to the fact that it is not a permanent bureau — will add to the force of this argument. Up to and including the census of 1860 mining was reported as a manufacturing industry. In the report for 1870 General Walker states: "The following tables do not embrace the statistics of the mining or the fishing industry of the country, both of which in 1860 were included in the manufacturing statistics of the census, but which in the present publication will be found presented in separate and independent tables." The census of 1870, however, includes returns for the smelting and milling of ores, and concentrating plants when it was possible to separate that branch of the industry from mining. The reports for 1880 and 1890 do not include either mining, concentrating, milling, or smelting, the only branches of this industry reported being the "smelting and refining base scrap metal, not from the ore," and "gold and silver reduced and refined, not from the ore." The report for 1870 includes "gold and silver reduced and refined" and includes those making the reduction from the ore as well as old silver, gold, and scrap metal.

The manufacture of gas was included as a manufacturing industry for all censuses expect that of 1880, when it was omitted by reason of the death of the special agent who had charge of the investigation. Petroleum refining was not included in the report on manufactures in 1880, but was so included in all other censuses. Petroleum refining and coke formed the subjects of separate reports in that census, and coke was included in the general report, while petroleum was omitted. In 1880, and possibly prior censuses, all establishments engaged in tanning and currying leather were counted as two establishments, one for tanning and one for currying.

The following industries were not reported in 1880, but were included in 1890. Some of these are again omitted in 1900.

Bottling.

Cars and general shop construction and repairs by steam railroad companies.

China decorating.

Clothing, women's, dressmaking.

Coffins and burial cases, trimming and finishing.

Cotton, cleaning and rehandling.

Cotton, ginning.

Cotton, waste.

Druggists' preparations, not including prescriptions.

Drug grinding.

Gas, illuminating and heating.

Hay and straw, baling.

Millinery, custom work.

These changes in the scope of the manufacturing census affect its value as a basis for measuring the comparative growth of the manufacturing industry. But they are all obvious variations, for which allowance can be made in a general way. They are as nothing, in their effect upon the comparability of the figures, in comparison with the internal differences, due to different methods of treatment, many of which are concealed beyond reach of detection. They exist everywhere and must always exist, and must always vitiate the statistics, so long as each succeeding census is compelled to be a law unto itself, by its divorce from its predecessors. Changes there must be, in the work, from decade to decade. Schedules must at times be modified, as the result of experience, or to correct error, or to take cognizance of changes in the methods of industry. Industries change; some disappear; others take their places; classifications can not be kept absolutely uniform, because nothing in industry is unaffected by the universal law of change which underlies

all progress. But because these changes and modifications are necessary, so much the more important is it, that they should always be made — as could be the case were the office permanent — in harmony with the traditions of the past, and in such a way as to reduce the dislocation of the statistics to a minimum. At present, they are made haphazard, and largely in the dark. Just how far they affect the integrity of the figures, we can never know. But we do know that strict conformity to the requirements of scientific statistics is impossible, except through the establishment of a permanent census office.

I conceive it to be possible, in a permanent census office, that no questions can arise at any stage of the work upon which it would not be possible to throw some light, if the records of the office were properly preserved and handled by the clerks who had a hand in their making. The scattering of these records and the destruction of precedents represent the loss of valuable and tangible property of an intrinsic value which it is difficult to measure by money standards; and in comparison with which the small annual cost of maintaining the division for the few years intervening between two censuses is not worthy of consideration.

5. It is doubtful, in the distribution of the census work provided for in the present Census Act, whether there need be an increased cost, so far as the division of manufactures is concerned, as the result of the establishment of a permanent census office. Section 8 of the act of March 3, 1899, provides that, after the completion of the work upon population, agriculture, manufactures, and mortality, certain special statistics shall be collected, including those relating to electric light and power, the telephone and telegraph business, transportation by land and water, the express business, street railways, and mines, mining, and minerals. The Director of the Census has indicated his intention to entrust the work relating to the special industries

above enumerated to the division of manufactures. We shall be ready to undertake it promptly upon the completion of the work in which we are now engaged, on or before July 1, 1902, the date fixed by law. These inquiries will occupy the time of a selected clerical force for two years or more. Undoubtedly there will be other statistical work along the general lines of the division of manufactures, which Congress could with advantage instruct the census office to undertake.

In this connection I desire to emphasize the advantage to the country, and more particularly to the cotton growing states, that will result from an annual census of the cotton crop, through the agency of the cotton ginners — a census which has now been twice most successfully conducted in the division of manufactures, and which has met with marked approval in the section of the country chiefly concerned. It is generally agreed by experts that the only accurate method of measuring the annual cotton crop is by returns from the ginners, through whose establishments every pound of the crop must pass before it becomes commercially available. There can be no question that the methods and facilities of the census office are better adapted to this particular inquiry than those of any other bureau or department of the Government.

Again, it is generally agreed among statisticians that a ten-year census of manufactures is too infrequent an inquiry to permit accurate and satisfactory judgment to be formed regarding the industrial progress of the country. The census may be taken at one decade, in a period of abnormal depression in industry, and, at the following decade, in a period of abnormal expansion and production. Such a period was actually in progress when the census of 1900 was taken. Comparison between censuses taken under such different conditions and with so long an interval between them, does not afford a satisfactory basis upon which

to measure the industrial progress of the nation. It was frequent enough, fifty years ago, when the factory system was in its infancy, and our manufacturing development was slow. But, with the opening of the twentieth century, we have reached a stage where the progress of a single decade marks an advance greater than that of an entire century prior to the days of perfected machinery and the full application of steam and electric power.

If there existed a permanent census office, it would be possible to take a quinquennial census of manufactures, which would be of enormous statistical, industrial, and economic value, and which would enable the government to measure and record the means and the degree of our industrial advance in a number of industries, with which it can only deal in the most general way under the present system.

In making this suggestion, I do not propose a five-year census along the same lines that the decennial census is conducted, including all the mechanical industries and hand trades of the country, but simply a census of manufactures proper — the great leading industries conducted under the factory system, and which produce nine-tenths of the total manufactured product, as shown by the decennial census. Even if a ten-year census of the mechanical industries and hand trades is worth while — which I doubt, for reasons that it is unnecessary to state in this connection — it would be entirely unnecessary in the quinquennial census suggested, because these local and neighborhood industries are but slightly affected by changes which make for prosperity or depression in the general manufacturing enterprises of the country. By eliminating these mechanical industries from the work, the canvass could be conducted at a comparatively small expense. I am convinced, that, with the aid of the records of the office and the lists of manufacturing establishments which it posesses, and which it can re-

vise from year to year, keeping it complete and up to date, the whole field work can be completed at a cost not to exceed one-fifth of the cost of the field work for the Twelfth Census, which was $454,416.75.

We expect to present the results of the Twelfth Census in in such form that the suggested quinquennial manufacturing census would be perfectly comparable with the corresponding ports for the year 1900. It can be prepared by a comparatively small force of clerks, who would have all the advantage of their training in the Twelfth Census, and who would thus be kept busy, in the preparation and compiling of the quinquennial census, up to the time when it would be necessary to begin preparation for the work of the Thirteenth Census. So that, if this recommendation should be approved and adopted by Congress, there would exist no interval at all, during which there would not be plenty of work for the division of manufactures to do, and work that would be of the utmost value to the country.

6. There is an immense undeveloped field of work open to the division of manufactures, in the direction of special reports on industries, which it is now compelled to handle only in the most general way; and in the statistical presentation of the direct relationships of capital, wages, and product in all the industries, which it is impossible to properly and scientifically handle, in treating the immense mass of material which is thrust upon the office in one lump by the decennial census. The haste with which the materials must be compiled, in order to present results with reasonable promptness, compels the abandonment of many forms of data which possess great economic and sociological value. If the office were permanent, all this material could be properly prepared for public use during the interval between censuses, and the country would thus obtain, what it does not now get, the full benefit of the enormous expenditure involved in the original gathering of this material.

I have refrained, in this communication, from any allusion to the waste that necessarily occurs in the rapid equipment every ten years of a great office like the census. These great expenditures, the recurrence of which would largely be avoided were the office made permanent, are not peculiar to the division of manufactures. I have confined myself to questions relating directly to my own division; but I may add in conclusion that I believe the saving that would arise, in the way just stated, would be sufficient to defray a large part of the cost of maintaining the division during the interval between censuses.

BY MR. POWERS, CHIEF STATISTICIAN FOR AGRICULTURE.

1. With the expansion of our national domain, and the progress of our country in all that relates to the cultivation of the soil, it becomes increasingly difficult to secure reliable statistics of the agricultural resources and products of the United States. It also becomes more and more desirable, if not absolutely necessary, to have the collection, revision, and tabulation of that data in the hands of experienced agents. Only such agents can successfully cope with the new and complex problems that present themselves with each decade. Without a permanent census office it is difficult, and almost impossible, to secure assistants who were employed in the preceding decade, and who are, by reason of such employment, familiar with the work of handling the vast mass of data collected in an agricultural census. In the Twelfth Census it was possible to secure the services of but *two* clerks of ability, who had been employed in any responsible place in the Eleventh Census. The office had to depend upon chance in its efforts to secure clerks familiar with the agricultural resources and products, with crops varying in character from those of the tropics to those of the arctic regions. With the further extension of our territory and the increasing complexity of agricultural condi-

tions, it is doubtful whether an agricultural census taken, in 1910, under like conditions, will not break down of its own weight and immensity.

The Twelfth Census has received reports from nearly 6,000,000 farms. To complete its agricultural schedules about 1,250,000 letters had to be written. Methods will have to be adopted that will secure more perfect schedules at the outset, thus lessening the relative and actual number of letters to be written, and simplifying the work of the office. A reliable agricultural census can be secured only by such prior preparation as could be brought about by a permanent office in charge of the work, with clerks of ability, who would bring to their duties training and experience in the most difficult part of census-taking — the handling of agricultural data.

2. A permanent census would secure to the office the services of men trained not only in methods of handling census data, but familiar with all the varying crops and products of the country, and thus better able to detect and correct erroneous reports on the part of the enumerators.

3. Unlike the division of manufactures, the agricultural division must depend for the collection of its statistics almost wholly upon the enumerators, who are appointed in all parts of the country. In 1850, with 25,000,000 people, and a fairly uniform system of agriculture, it was comparatively easy to harmonize the returns made by the enumerators. With 90,000,000 (which we will have in 1910), and with a very complex system of agriculture, that work will be very difficult. It must begin with some sort of training of enumerators. They must be instructed in their duties, and so enabled to return more correct reports. This instruction can not be given unless the Census Office has a sufficient number of trained experts at its command to send into the field for the purpose of educating the enumerators in their duties so as to lessen the subsequent work, especially

in the line of correspondence for necessary corrections in the office at Washington.

4. A permanent census office would increase the value of the statistics published. They would be collected under more uniform conditions from decade to decade. With the best of intentions, no two men, not familiar with each other's methods, can collect and tabulate such a mass of statistics as is contained in an agricultural census, and conduct all of the work under similar conditions. A permanent census, retaining a number of efficient employees, would preserve the traditions of the office and would lead to greater uniformity and accuracy in the statement of results and to an earlier publication of the same, thus making them of greater value to all students of economics and to the farming communities.

5. A permanent census would also tend materially to lessen the expense. One great source of outlay in this division is in perfecting the schedules. More perfect instruction of the enumerators would greatly lessen the work of perfecting the schedules in the office. Clerks familiar with their duties at the outset could avoid much of the experimenting that under present conditions is absolutely necessary, and in this as well as in other ways the expenses of the division could be materially lessened.

6. The business interests of the nation are finding each year greater use for more accurate annual estimates of the leading crops of the country, as well as of the number of domestic animals. Experience shows that, to insure the correctness of these estimates, a census of live stock, and of the leading crops of the country, should be taken every five years. A permanent census would permit the collection of such statistics, with but a moderate increase upon the present cost of the census statistics of agriculture.

7. A permanent census with expert clerks would permit the collection, with no great additional outlay of money, of

many very important and valuable statistics relating to farm tenure, the cost of producing crops and kindred subjects. These, if collected, would make the present statistics of agriculture more valuable to all interested in them.

BY MR. KING, CHIEF STATISTICIAN FOR VITAL STATISTICS.

One of the most important branches of census work consists of that relating to mortality and vital statistics. These statistics are of direct importance to each person, for in none other can the deductions and conclusions derivable from them be so certainly employed to promote individual health and welfare.

Accurate vital statistics are essential to the determination of questions arising in every branch of social science. Reliable mortality statistics are of supreme importance as the very basis of sanitary science and practice; but, to afford data for reliable deductions and sound conclusions, these statistics should be compiled and published much more frequently. The results for one year in every ten may be normal, or they may be greatly abnormal, as the conditions vary which affect the public health. The data should be available for each year, to compare results under the different conditions existing.

In a large portion of the country the states and cities have provided for the registration of deaths, and the facts are of record and available for statistical purposes most economically, without any such expense for the collection of the original data as attends investigations requiring a field force.

The registration area in 1900, as given in the Twelfth Census reports, comprehended a population of nearly 29,000,000, or about 38 per cent of the entire population of the country. It then embraced 10 states and 153 cities of 8,000 or more population in other states. Since then the two great states, Illinois and Indiana, have enacted laws which promise satisfactory results, adding 5,000,000 to the

population represented, and the movement is constantly growing in other directions.

Congress has recognized the necessity for additional information on the subject by providing for the preparation of "statistics of births and deaths in registration areas," as a part of the supplemental work authorized to be taken up after completion of the census proper.

The registration data available are required only by local laws or ordinances. There is no national system of registration, and no means of collecting, compiling, and reducing to a uniform series of tabulated statistics the data recorded under the various local provisions, except such as is afforded by the Census Office.

A large amount of money is expended by local authorities in preparing more or less complete reports, but the methods are hardly identical in any two places, and the results are not comparable. In most cases the statistics published are very meager, and but few of them attempt anything like the comprehensive compilations of the census, which are essential to thorough analysis.

This office is now acting in conjunction with a committee of the American Public Health Association, consisting of Dr. John S. Fulton, of Baltimore, Md.; Dr. Samuel W. Abbott, of Boston, Mass.; Dr. Charles V. Chapin, of Providence, R. I.; Dr. H. M. Bracken, of St. Paul, Minn.; Dr. Cressy L. Wilbur, of Lansing, Mich.; Dr. Wm. H. Welch, of Baltimore, Md.; Mr. M. N. Baker, of New York, N. Y.; and Dr. William C. Woodward, of Washington, D. C., (most of whom are the leading officials in the vital statistics work of the states or cities they represent) in deciding and formulating the essential features of a comprehensive and effective law for the registration of deaths, a standard form of certificate or return to be used in reporting deaths, and the best practice to be followed in recording, filing, and transmitting the local returns, so as to make the data uni-

form, to increase the sphere of their usefulness, and to render them more completely and promptly available for the census statistics.

This work will have the approval of the American Public Health Association, the American Statistical Association, the American Economic Association, besides other statistical and scientific bodies, and Government and state officials, and will represent the combined views and practical experience of all those most directly interested in this class of statistics.

It will be of the greatest value in promoting the extension of the registration system along lines of practical scientific value, and of inducing reforms in existing local laws and methods necessary to secure uniformity of results.

This, however, will require time and continuous work. It can not be effected at once, nor by spasmodic efforts at intervals, and a permanent organization of the census office, acting as a central compilation bureau, will contribute powerfully to this end.

It is estimated that records of something like 600,000 deaths will be available from states and municipalities which — in the language of the Census Act — "possess registration records affording satisfactory data in necessary detail."

For these an annual report may be made which will give, in a condensed form, all of the principal results for comparative purposes, which will still be more extensive and valuable than any now existing, and which can be expeditiously and economically compiled and promptly published. The cards used in the preparation of such reports will then be available for more exhaustive compilations, covering any desired series of years and affording average annual rates and ratios of still greater value.

For this purpose we now have a force of clerks who have been trained and educated in this kind of work, whose

capabilities have been tested and proved, who can enter upon this work with an adequate knowledge of what they will have to do, and whose experience will enable them to improve upon their earlier efforts. From the number now employed the most capable can be selected to form the small force required.

I feel sure that the Twelfth Census work on this subject has been performed as economically as was possible with an entire force of inexperienced clerks, but I *know* that it could be repeated, or similar work done by them, now that they have gained experience, not only with much less expense, but also much more quickly.

REVIEWS AND MISCELLANY.

NOTES ON FOREIGN CENSUSES.

The French Census of March 24, 1901, the results of which were published in August, shows a total population of 38,641,333, an increase of 412,364 since 1896, or about one per cent. Although this is a higher rate of increase than that between 1886 and 1896, it is so low as to cause considerable anxiety to French publicists. Paul Leroy-Beaulieu analyzes some of the census results in *L'Economiste Français* (July 6, 1901, p. 11, and August 24, 1901, p. 262), and incidentally criticises severely several details in the practical taking of the census. He points out that the slight improvement as compared with the period prior to 1896 was to be expected on account of a reduction in mortality due partly to a decreased prevalence of influenza and also on account of unusually good industrial conditions, including the exemption of the wine industry from the attacks of the Phylloxera. Of the 87 departments, only 28 have increased in population during the last five years. That of the Seine alone has gained 289,662, or nearly three-fourths of the total gain for the nation; this represents an increase of almost 9 per cent. The other departments which show a growth in population are almost all on the frontiers, the most marked increase being along the Mediterranean. In all cases the cities, for example, Marseilles, Nice and Toulon, exhibit the greatest gains. Only four of the departments in the interior have held their own in population; and in the richest regions of Normandy, Gascony and Burgundy, a general and, in some cases, very startling decrease is manifest. While the population of France since 1850 has only increased by 3,340,000, that of Italy has gained nearly 9 millions, that of Great Britain more than 14 millions, that of Austria-Hungary the same, that of Germany 21 millions, and that of Russia 62 millions. M. Leroy-Beaulieu dwells upon the immigration, which is already beginning, from adjoining

territories, as an evil; and advises checking the decrease of native population by reducing the French death-rate through sanitary precautions and by increasing the birth-rate through favors and exemption granted to families with three or more children. The reduction of the death-rate is, no doubt, possible; the other part of the program seems less practical. To an outsider, (see editorial in the *Economist* for June 22, 1901), it seems, in the first place, that the conditions existing in France are not unmixed evils, as a small population may be made a very efficient one both in a commercial and a military sense by intelligent training; and, in the second place, that an increase of population by immigration need not necessarily be deplored.

The decrease in the rural population of France is discussed at some length by Emile Chevallier in *L'Economiste Français* for June 8 and June 15, 1901 (p. 806 and p. 846). The proportion of the population living in towns of less than 2000 inhabitants has fallen, during the period 1846-96, from 75.6 per cent to 60.9 per cent. Individual districts have lost one-third, or even one-half, of their population during that period. This is not due, as in other countries, simply to emigration toward the industrial centres, but largely to a decreased birth-rate. In many towns the deaths during recent years have greatly exceeded the births, in some cases, by one hundred per cent. The birth-rate per one hundred inhabitants in one district was 3.4 in 1799 and 1.7 in 1899; in another district it was 3.3 in 1800 and 1.4 in the period 1896-98, etc. The cause of these phenomena is, of course, the exaggerated prudence and ambition of the small cultivator, leading him to limit his family in order that his children may be prosperous. In one district, in particular, it is noted that "the fathers and mothers of large families are turned to ridicule." Emigration to the cities has also, of course, played an important part in the depopulation of the rural districts. The following table shows the increasing number of such emigrants from one commune:

Period.	*Males.*	*Females.*
1844–50	1	3
1850–60	19	18
1860–70	16	6
1870–80	20	13
1880–90	20	13
1890–99	27	25

M. Chevallier points out the relation of the movement of population to the introduction of railways, to the inoculation of the young farmers with the virus of town life during the enforced period of military service, and, in particular, to the improvements in agricultural machinery, which have driven many of the laborers out of employment.

The decennial census of Great Britain and Ireland was taken on March 31, 1901, or just one week after the French census; and its results are much more encouraging than are those of the latter. It shows a total population for the United Kingdom of 41,454,219, against 37,731,922 in 1891, a gain of about 10 per cent. In England and Wales, alone, the growth is still more striking, as is shown by the following figures:

	Population 1891.	*Population 1901.*
England and Wales,	22,002,525	32,525,716
Scotland,	4,025,647	4,471,957
Ireland,	4,703,750	4,456,546

While England and Wales have increased by about 12 per cent, and Scotland by about 11 per cent, Ireland has lost more than 5 per cent of its population. The rate of increase for England and Wales is slightly greater than that of the previous decade (12.15 against 11.65 per cent.) In a valuable review by Edwin Cannan (*The Economic Review*, XI, 1901, p. 358), it is pointed out that, while the excess of births over deaths was somewhat less between 1891 and 1901 than in the previous decade, the net loss by excess of emigration over immigration was diminished in a greater degree, having fallen in the United Kingdom from 1,556,803 to 589,887. In England and Wales the net loss in the ten years by emigration is only 70,003, and as the emigrants include some 150,000 troops in South Africa, it appears that this portion of Great Britain has actually been colonized rather than colonizing. Ireland, on the other hand, has lost heavily by emigration, though much less heavily than in the previous decade; her proportion of 32.6 per cent of the population of the United Kingdom in 1801 has fallen to 10.8 per cent. M. Leroy-Beaulieu in *L'Economiste Français* July 20, 1901, makes the decrease of the population of Ireland from 8,000,000 to 4,500,000 in sixty, years the text for a vehement and not unde-

served phillippic against the social and political régime under which it has occurred. In all parts of the United Kingdom the tendency to urban concentration of the population is shown with great distinctness. While the increase in the rural population of England and Wales is only 2.9 per cent, that of the urban districts is 15.2; and Cannan believes that if town outskirts and suburbs were excluded from the first class an actual decrease would be shown. The population of greater London has increased 17 per cent, reaching 6,578,00, or more than one-fifth of the total for England and Wales. Even in Ireland, Dublin and Belfast have increased by 7.9 per cent and 27.8 per cent respectively; and in Scotland, the county of Lanark, including the city of Glasgow, has gained 232,000 persons, more than half the total increase for that Kingdom. In general, the seaport and railway works towns show handsome gains, while the cotton and woolen districts in the north of England have grown but slowly. An extraordinary mistake was made in the first published results of the census in the table showing the per cent of increase in urban districts of various sizes. Instead of comparing the same towns at the two periods, 15 towns having between 100,000 and 250,000 population in 1891 were compared with 24 towns of the same size in 1901, giving a rate of increase of 44.61. A corrected table was published later, from which the following is extracted:

Urban Districts with Population of	Number of Districts.	Mean Percentage Increase 1891–1901.
250,000 and upward	9	9.32
100,000–250,000	24	17.74
50,000–100,000	42	23.15
20,000–50,000	141	20.37
10,000–20,000	219	18.44
3,000–10,000	472	12.40
Under 3,000	215	4.60

The German census, taken December 1, 1900, gives a population of 56,345,014, an increase of 7.78 per cent since 1895, the highest rate yet recorded. Berlin has now 1,884,151 inhabitants, an increase of 11.6 in the quinquennial period. The growth of the population is due to the high birth rate (37.1 per thousand for the three years

1894-96), and to the decreasing death rate (30.62 in 1872, 22.9 in 1894-96). The excess of births over deaths is greater than in any European country except Russia.

A valuable paper by J. A. Baines in the *Journal of the Royal Statistical Society*, vol. LXIV, 1901, p. 493, contains reviews of all the recent censuses. The author notes the lessening rate of increase of population, both in the new and the old world. The mean decennial rate for the first half of the nineteenth century was 15.05 in England and Wales, and that for the second half only 12.66. In the United States the corresponding figures are 34.3 and 26.7. Mr. Baines suggests the correlation of the comparatively low rate of increase in the United States between 1890 and 1900, which was only 20.7, with the decreased emigration noticed above in connection with the English census and also indicated by returns from Germany and Sweden. In Mexico the new census shows an increase of 7.2 per cent in the country at large; the capital has increased by 13 per cent; but otherwise the smaller districts show the greater gains. The Canadian census for 1901 shows a population of 5,338,883, an increase of only 10.46 against 11.75 for the previous decennium, and 18.75 from 1871 to 1881. The lessened increase in 1891 has been attributed to the fact that in that year, for the first time, the rule prevailed that persons who had been out of the country for a year or more should not be enumerated. The 1891-1901 increase in Lower Canada was small, 5.2 per cent, and in the Atlantic seaboard districts only 1.4 per cent, while the Northwest and Pacific coast region shows an increase of 87.7 per cent. The Government estimate of immigration into Canada during the decennium is 500,000, about equal to the increase in population. It therefore appears that the normal growth of population by the excess of births over deaths has been just neutralized; and the balancing force must have been a slow filtering of the Canadian population across the border into the United States. In reviewing the German census, Mr. Baines points out that, while France has had an annual increase of 23 per ten thousand during the last twenty-nine years, Germany has a corresponding figure of 110; furthermore, the German rate has steadily risen since 1880. Prussia now contains 61.17 per cent of the total population; Bavaria 10.96; and Saxony, 7.45.

The towns of over 100,000 inhabitants contained, in 1900, 16.17 per cent of the total population, and their increase between 1895 and 1900 was 17.7 per cent. The Italian census of February, 1901, is the first since 1881, and shows strikingly the error introduced into vital statistics by basing estimates of population on infrequent enumerations. The estimate for the whole Kingdom based on the growth between 1871 and 1881 was within 1.2 per cent of the actual value, but in the smaller districts divergencies of 6 to 12 per cent occurred. In Tuscany the estimate was 8.6 too low; in Florence 12 per cent two low,; in Rome 9.6 too high. The increase of the whole population since 1881 has been 14.02 per cent against 7.13 per cent between 1861 and 1871, and 6.19 per cent between 1871 and 1881. The greatest gains are in the inland cities, Rome having grown by 54 per cent and Milan by 53 per cent. The seaport towns have increased less rapidly. In spite of the drain of emigration (308,000 persons in 1899), only one district in Italy, the Basilicata, shows a decrease in population since 1881.

Austria and Hungary exhibit percentage rates of increase of 9.3 and 9.6 respectively during the last decade, and in both countries a large increase in population due to a rapidly declining death-rate has been partly balanced by an increase in immigration. In Switzerland, the census of 1900 shows the same fall in the death-rate. While the birth-rate fell only from 3.09 in the period, 1870-80, to 2.86 in the period 1888-1900, the respective figures for the death-rate were 2.36 and 1.96. The population of the nine large Swiss towns has increased by 63 per cent during the last twenty years, while the rate for the whole country has been only 16.9. The census of 1899 in the Netherlands furnishes some interesting figures on sex distribution; the excess of females in the smaller towns, under 20,000 inhabitants, has fallen from 18 per mille in 1830 to a deficiency of 1, while in the whole country the excess has fallen from 40 to 25. In Sweden the proportion of females to males had fallen to 1049 to 1000 in 1900, while the figures between 1850 and 1890 ranged between 1065 and 1061, and at the beginning of the census studies in 1750 the ratio was as high as 1129. The Norwegian population has increased during the last ten years at a rate of 1.10 per cent per annum, considerably above the Swedish rate of .71 per cent. The large towns of Norway show an especially rapid

increase, the rate for the last ten years being 30.5 per cent for the urban, and 5.5 per cent for the rural population. The results of the Danish census of February, 1901, coincide with those of the other countries considered; they show an accelerated increase in population due on the one hand to a growing excess of births over deaths, and due, geographically analyzed, to great growth of the towns, and especially of those of medium size.

C.-E. A. WINSLOW.

NOTES ON VITAL STATISTICS OF AMERICAN CITIES.

The *Annual Report of the Board of Health of Manchester* (N. H.) for 1900 illustrates the importance of correct estimates of population in calculating death-rates. The estimated population for 1896 was 56,000, with a death-rate of 18.77. In the next three years the population was estimated at 60,000, which, with a slight actual decrease in total deaths, brought the rates down to 16.97, 16.68 and 17.80. In 1900 the population was found to be 56,987 and the death-rate jumped to 20.47. The ratio of deaths of children under five years to the total deaths is interesting, showing a progressive decrease between 1897 and 1900 of 61.98, 52.04, 50.65 and 48.07. The table of cases of, and deaths from, zymotic diseases shows, apparently, unusual success in securing reports of measles and scarlet fever. There were 762 cases of measles with 5 deaths in 1899, and 827 cases with one death in 1900. On the other hand, 46 cases of diphtheria and membranous croup with 13 deaths indicates either poor reporting of cases or neglect of antitoxin treatment. The separation of these diseases (diphtheria and membranous croup), in the table, and the summation of all the zymotic diseases are misleading.

The *Annual Report of the Board of Health of Worcester* (Mass), for 1900 contain some good anti-toxin statistics, as will be seen from the following table extracted from that on page 10 of the report.

FATALITY RATE.—PER CENT.

Year.	Diphtheria.	Scarlet Fever.	Typhoid Fever.
1895	27.55	3.78	17.98
1896	19.85	2.67	11.02
1897	17.62	3.14	15.00
1898	11.48	2.32	16.04
1899	10.61	.17	18.26
1900	9.46	7.59	21.76

The total death-rate for the city rises from 15.89 for 1899 to 18.77 in 1900, a higher figure than any since 1893. This excess is due to an excess of lung and throat troubles amounting to nearly one-third of the total deaths. In the diagram exhibiting the relation of the twenty principal causes of death a not unusual conservatism has prevented the classification of tuberculosis and pneumonia as zymotic diseases. It is strange that so few Boards of Health accept the progress of medical science in this respect.

The *Annual Report of the Superintendent of Health of Providence* (R. I.), (Dr. C. V. Chapin), for 1900 shows the same excess of measles which prevailed in Manchester, N. H., as noted above, and in many other cities. There were 97 deaths from this disease in Providence in 1900, more than the deaths from scarlet fever, typhoid fever and diphtheria combined, but only 901 cases were reported. Valuable tables are given for typhoid fever, diphtheria and scarlet fever, showing the number of cases and deaths in each month since 1884. The average fatality for the whole period is 29.61 for typhoid fever, 21.81 for diphtheria, and 8.90 for scarlet fever, all much too high. Dr. Chapin's statistics with regard to the ratio between cases of diphtheria and scarlet fever and the number of persons exposed to infection (members of families of patients), covering the period 1889-1900, are of great interest. The ratio of cases to the number of persons exposed, classified by ages, show a rise from 19.9 under one year, to 49.0 between one and two, and 65 and various fractions from two to five years; then a steady fall to 51.3 between 8 and 9, and 40.1 between 12 and 13, more variable figures ranging from 19.0 to 33.9 between 13 and 21, and a fall to 8.7 for adults. For scarlet fever the figures are very similar.

Under one year the rate is 24.3, between 1 and two years, 46.2, between 2 and 3 years, 59.2, between 3 and 8 years, from 63.5 to 69.4; from 8 to 17 years, an uninterrupted fall from 58.2 to 24.1; and for adults the ratio is only 4.7. Another table shows the percentage of well persons in families where diphtheria occurred in whose throats diphtheria bacilli were found. The average percentage for all ages for 1897-1900 was 16.2, the highest figures 34.1 and 34.0, being at the age of 4 and 6 years, and the figures for adults being 12.1.

More elaborate statistics for the city of Providence are found in the *Forty-sixth Annual Report upon the Births, Marriages and Deaths for the year 1900*, edited also by Dr. Chapin. This model report begins with an analysis of deaths by sex, social condition, nativity, parentage and season, in connection with which it is interesting to note, as typical of many American cities, that of 3678 decedents, only 2569 were natives of the United States and only 1402 were of American parentage. A table of the age of decedents by parentage shows that for forty-five years, 1856-1900, the average age of the children of American parents was 34-43 years, and for children of foreign parents, only 27.77. Deaths, classified by age periods, parentage and seasons follow, succeeded by tables of deaths by cause, sex, age, parentage and season. Each important cause of death is then studied, the statistics as to sex, parentage, age and season being given for forty-five years. The most striking fact in these tables is the extraordinary fatality from pneumonia and congestion of the lungs, in 1900, 261 per 100,000, the highest figure previously recorded being 217 for the period 1891-95. Of the 7568 deaths from these causes in 1900, 3062 occurred in the first quarter of the year, and 1379 of the decedents were under one year of age. The marriage statistics for forty-five years show average ages of 28.03 and 23.03 years for grooms and brides, respectively. Finally, the report contains an exhaustive analysis of birth statistics.

The *Annual Report of the Bureau of Health of Philadelphia* for 1900 contains rather meagre statistics considering the importance of the city. The high fatality rate for diphtheria is notable; in 1896 it was 31.96, and for the four following years, 27.28, 26.14, 20.40 and 17.97, respectively. The death rate for typhoid fever was 34.71 per

100,000 in 1900, an improvement over the epidemic figure of 1899, which was 74.82. Tables of the age distribution of typhoid fever and the monthly distribution of that disease and of scarlet fever and consumption for 39 years would be rendered more helpful by the printing of totals. An addition of the figures for typhoid fever deaths by age periods for the ten years, 1891-1900, gives the following result:

Years.	Deaths.	Years.	Deaths.
Under 1	19	30–40	981
1–2	20	40–50	455
2–5	123	50–60	202
5–10	323	60–70	112
10–15	386	70–80	47
15–20	796	80–90	9
20–30	1819	90–100	1

C.-E. A. WINSLOW.

STATISTICS OF DISEASES.

The *Twenty-eighth Annual Report of the Secretary of the State Board of Health of Michigan* for the year ending June 30, 1900, contains, as usual, an interesting study of the relation of meteorological conditions to the prevalence of disease. The statistical material for this comparison is obtained from 214 medical observers who send in weekly reports of the relative prevalence of the diseases which have come under their observation, marking the disease of which most cases have been seen, one, and so on. The percentage of reports stating the presence of any disease gives for each week a sort of morbidity rate which serves very well for comparison of the different seasons. The tables show that bronchitis, pneumonia, membranous croup, diphtheria, tonsilitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, and pulmonary consumption, or the "cold-weather" diseases, were reported on more than the average per cent of weekly reports, in months which had a relative humidity, an average per cent of cloudiness, ozone, average velocity of wind, and

average range of the barometer greater than that for the year and an average daily temperature, average daily range of temperature, absolute humidity and average atmospheric pressure less than that for the year. On the contrary, the "warm weather" diseases, diarrhœa, cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles and whooping cough, bear an inverse relation to all meteorological conditions cited. The monthly relations of some of the most typical diseases of the two classes are shown by the following table, abstracted from several of those given in the report.

PER CENT OF WEEKLY REPORTS IN WHICH CERTAIN DISEASES WERE REPORTED. TWENTY-TWO YEARS, 1877-98.

Cold Weather Diseases	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bronchitis	71	72	71	68	58	49	41	40	46	53	62	66
Pneumonia	49	52	50	43	32	19	12	10	13	18	27	36
Influenza	72	66	64	56	40	27	19	19	27	32	42	53
Warm Weather Diseases												
Diarrhœa	26	26	28	29	32	41	66	80	76	53	33	26
Typhoid Fever	9	7	5	4	4	5	7	13	19	21	18	12
Cholera Infantum	3	1	2	2	3	9	27	41	33	12	3	2

Tha major portion of the Michigan report is devoted to a consideration of the communicable diseases reported during the year 1899. In connection with this work of the Board 8326 local newspapers are reviewed for information in regard to outbreaks of these diseases; 46 per cent of the newspaper reports were confirmed by the local Health Office, and 21 per cent were denied. The statistics given for the various diseases are of the highest value, including the relation of the maladies to concentration of population, disinfection and age and sex of the patients, as well as the average incubation period, and duration of fatal cases. The importance of concentration in the case of diphtheria is shown by the death rate of 2.60 per 10,000 population in cities, of 1.32 in villages and 1.26 in townships. This relation does not hold for scarlet fever and measles. The value of isolation and disinfection is indicated by the fact that during the thirteen years, 1887-99, there were 823 outbreaks of diphtheria in which

both of these precautions were neglected, with an average of 11.75 cases and 2.41 deaths per outbreak; while in 910 outbreaks in which both isolation and disinfection were enforced, the average number of cases was 2.16, and of deaths, .45. The corresponding figures for measles are 54.03 cases and .43 deaths where precautions were neglected and 2.56 cases and .02 deaths in the 248 instances in which they were thoroughly carried out. The same striking relation is shown for scarlet fever and whooping cough, and even for typhoid fever. The fatality rates at different ages for certain of the infectious diseases are of considerable interest.

DEATHS IN EACH AGE GROUP, IN PER CENTS, OF THE CASES IN THAT GROUP.

Diseases.	Age.														
	0–1	1–2	2–3	3–4	4–5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50 and over
Diphtheria.....	79	53	43	35	28	22	13	14	7	5	3	4	6	20	—
Scarlet Fever....	26	20	13	12	4	4	2	3	2	0	8	0	0	0	0
Measles.....	28	15	7	1	2	1	1	2	1	3	0	11	4	12	5
Whooping Cough	63	32	13	6	6	2	0	4	13	0	0	0	0	0	0

It is strange that only 14 cases of pneumonia were reported to the Board during the year, with five deaths. Of meningitis, on the other hand, 1306 cases were turned in; and the returns of most of the other diseases seem to show a very satisfactory system of reporting.

The question as to the prevalence of cancer is re-opened by R. Teece in the *Journal of the Institute of Actuaries*, for July, 1901, p. 89, under the caption, "The Increase of Cancer." Mr. Teece takes issue with the conclusion reached by King and Newsholme in 1893, that the "increase in cancer is only apparent and not real, and is due to improvement in diagnosis and more careful certification of the causes of death"; and the original paper of Mr. King and Dr. Newsholme is reprinted in the same number of the Journal. It will be remembered that these authors, in the first place, emphasized the fallacy of arguing from general death-rates when dealing with a disease mainly affecting certain age periods; and they corrected all their rates for the actual age distribution of the population. In the second place,

they analyzed the statistics of cancer in the city of Frankfort according to the part of the body affected and showed that the greater prevalence of cancer among females was due entirely to cancer of the sexual organs,— cancer in other parts of the body affecting both sexes equally,— and that the increase of cancer from 1860 to 1889 was due to an increase of cancer in the internal organs, while cancer of the tongue, mamma, uterus and vagina has remained stationary. This, the authors considered, pointed conclusively to the importance of more accurate diagnoses in increasing the amount of cancer. Mr. Teece has carried on the tables given by King and Newsholme, bringing the statistics of the cancer deaths by age periods for England and Wales up to 1897. The steady increase noted by the previous observers continues in a marked manner, the deaths of males over 45 having risen from 1942.4 per million in 1881-97, to 2970.6 per million in 1895-87, and that for females having risen from 2990.0 to 3923.4. Mr. Teece thinks the rise during this latter period can scarcely be accounted for by improvement in diagnosis. Finally, he submits cancer statistics for the seven Australasian colonies, which show a marked increase during the last forty years. The present rates are, however, far below those occurring in Europe. These Australasian figures are not analyzed by age periods, the author dismissing this matter with a single table, showing that in New South Wales and Victoria the increase in the proportion of the population over 45 years has been but slight. This is not quite satisfactory, for, as Mr. King pointed out in discussion, a change from a population, 87.6 per cent of which was under 45, (Victoria, 1871), to one of which 83.2 per cent was under 45 (Victoria, 1891), would raise a corrected cancer rate of 467 per million to one of 562. In the discussion of Mr. Teece's paper, Dr. Newsholme furnished an interesting table of the deaths from cancer by affected parts in Ireland in 1887-89 and 1897-99, and in Brighton in 1889-91 and 1898-1900. While the Irish statistics show an increase from .43 per 1000 to .58, those for Brighton give rates of .86 and .83. This bears out Dr. Newsholme's observation, that in communities where medical attendance is especially skilled, the cancer rate is high and stationary, while in districts like Ireland and the Australasian colonies it is rising toward the true level, as diagnosis and certification improve. It is interesting to note, however, that the Irish statistics show marked increase in cancer of certain parts where the disease is not difficult of

diagnosis. Thus among males, in the periods cited, deaths from cancer of the head, face, eye, orbit, nose and ear have increased from 215 to 260, — from cancer of the jaws from 93 to 146, — of the mouth, tongue and lips from 304 to 423, — and of the neck, throat, tonsils and larynx from 216 to 292. The question as to the reality of the increase of cancer can probably only be definitely settled by the lapse of time. If Dr. Newsholme is right, the conditions as to accurate diagnosis and thorough certification which obtain at Brighton will be shortly reached by other cities, and the apparent increase of cancer will then come to a standstill.

Some valuable cancer statistics are to be found in a paper by Dr. R. Laspeyres entitled *Ein Beitrag zur Krebsstatistik* in the *Centralblatt für allgemeine Gesundheitspflege*, vol. XX, 1901, p. 342. The author analyzes the figures for certain Prussian provinces for the period 1891-95. The death rates from cancer for the five decennial age periods between thirty and eighty are compared in great detail, and the relation between a high cancer rate and the concentration of population is clearly shown. For example, the following table may be cited: —

DEATHS FROM CANCER PER 10,000 LIVING AT THE CORRESPONDING AGE PERIOD.

Age Period.	30–40		40–50		50–60		60–70		70–80		30–80	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Prussia, as a whole...	1.53	2.96	6.85	9.40	18.72	19.31	33.29	28.86	32.15	29.15	4.66	5.38
All urban districts....	2.10	4.30	10.10	14.10	27.60	28.00	51.60	41.90	55.00	47.40	6.28	7.96
Large cities.....	2.50	3.90	12.30	18.30	34.30	36.50	68.00	53.00	81.00	67.00	6.33	9.79
Cities of medium size	2.40	4.80	8.90	16.10	32.00	30.90	61.00	49.60	66.00	57.00	6.37	8.32
Small cities.....	1.60	2.80	7.60	9.80	21.00	21.20	39.40	32.10	38.00	31.00	5.34	6.34
Rural districts.....	1.16	1.85	4.60	6.10	13.50	13.60	23.70	19.90	21.90	17.60	3.58	3.64

Arranged in another way, according to the density of population, the statistics exhibit the same relation, as follows:

Number of Districts.	Inhabitants per Square Kilometer.	Deaths from Cancer per 10,000 Population between 30 and 80.	
		Males.	Females.
10	14	14.1	13.3
14	26	17.1	17.0
10	80	20.1	19.4

A consideration of the statistics for the Rhine province and Westphalia shows a similar phenomena:

Character of Districts.	Number of Districts.	Inhabitants per Square Kilometer.	Deaths from Cancer per 10,000 total population.
Purely Agrarian.....	38	74.6	3.1
Mainly "	23	106.0	3.5
Mixed Agrarian and Industrial...	12	172.0	3.7
Purely Industrial.....	26	416.0	3.8

All these facts correspond with Newsholme's theory that the apparent increase of cancer is due simply to improved diagnosis, as medical service must be at its best in the large centres. Finally, Dr. Laspeyres' figures show that in the districts considered the female death rate from cancer is higher than the male death rate only in the age period, 30-50, while after fifty years the conditions are reversed.

The *Thirty-second Annual Report of the State Board of Health of Massachusetts* for 1900 contains a valuable review of the "Statistics of Cancer in Massachusetts," by Dr. W. F. Whitney, which furnishes another support to the theory that the increase of that disease is only apparent. Dr. Whitney concludes that, "The assumed increase is probably due to better diagnosis and registration, and until the ratio of all the deaths from cancer, over thirty years to the total mortality of the same ages has reached 8 or 9 per cent, which is shown by autopsies to be the true ratio for cancer, it is not justifiable to speak of the increase as inherent in the disease itself." Tables are given of the population and of deaths from cancer and from all causes for each of the five-year periods from 1850 to 1895, classified by decennial age periods, and the ratios of cancer deaths to the population are calculated. The final result is summarized in the following table:

INCREASE OF CANCER IN MASSACHUSETTS. RATIO OF PERCENTAGES OF 1895 TO THOSE OF 1870.

Ages	30-40		40-50		50-60		60-70		70-80		80-100	
Sex	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.
Pecentage of total mortality	2.01	1.44	1.82	1.59	1.49	1.63	1.66	1.48	1.43	1.63	1.61	1.35
Death rate	1.91	1.26	1.99	1.64	1.81	2.02	2.01	1.85	1.61	1.83	1.65	1.41

The same excess of female over male cancer deaths at the earlier age periods, which was shown in the German statistics above quoted, appears in Massachusetts, and it is further apparent that this excess at the earlier period is lessening yearly. This corresponds well with the fact that the forms of cancer principally prevalent among females at these age periods are easily diagnosable, so that a rise in the ratio of males to females was to be looked for. The final table given is as follows:

PROPORTION OF CANCER DEATH RATE, FEMALE TO MALE.

Age	30-40	40-50	50-60	60-70	70-80	80-100
1870	4.36	3.77	2.05	1.51	1.15	1.13
1895	2.92	3.27	2.23	1.40	1.31	0.98

Comparative tables for the six New England States, for Michigan, England and Wales and Austria are also given, showing the ratio of cancer to general mortality. The results extracted from the tables for the New England States (the age periods for the European States are different), are as follows:

PERCENTAGE OF CANCER DEATHS TO TOTAL MORTALITY, 1895.

States.	All Ages	Ages over 30	30-40	40-50	50-60	60-70	70-80	80-100
Maine	4.35	6.73	3.60	8.44	11.23	8.97	6.39	2.80
New Hampshire	3.80	6.01	3.27	7.86	9.02	7.77	5.60	2.67
Vermont	3.56	5.60	2.75	7.64	8.88	7.56	5.13	2.58
Massachusetts	3.49	6.58	3.10	7.54	10.37	8.86	5.64	2.72
Rhode Island	3.07	5.86	3.05	6.79	8.10	7.20	5.25	2.86
Connecticut	3.14	5.50	2.66	7.45	8.31	7.36	4.32	2.46

Of the regular statistical material in the Massachusetts report for 1900, may be mentioned a diagram of the reported mortality from diphtheria and croup, and from scarlet fever by weeks for a period of 18 years. The autumnal rise, beginning in September, just after the opening of the school term, is shown with great distinctness in the case of diphtheria and croup. The death rate from consumption in 1900 fell to 18.5, the lowest figure ever recorded and the culmination of an almost steady fall from 42.7 in 1853. In absolute number of deaths this disease for the first time takes the second place, being exceeded by pneumonia. The changes in the typhoid death rate since 1871 are equally encouraging:

TYPHOID FEVER DEATH RATE PER 10,000 POPULATION.

	1871–75	1876–80	1881–85	1886–90	1891–95	1896–1900
Mean for the Cities.....	8.2	4.2	5.1	4.6	3.4	2.6
Mean for the State.....	8.2	4.3	5.0	4.1	3.2	2.4

At the end of the report are the usual statistics as to the fatality and seasonal prevalence of the infectious diseases, which are always of interest. The fatality rates given are as follows: Diphtheria, and croup, 10.2; scarlet fever, 5.3; typhoid fever, 16.5; measles, 1.7. It may be noted that the diphtheria rate has fallen to 10.2, from 11.6, the lowest previous figure, while the fatality rates of scarlet fever and measles have increased, and the reported cases of diphtheria have nearly doubled as compared with 1899. In the pre-antitoxin period, 1891-94, the diphtheria fatality ranged between 28.5 and 31.7. In 1895 it was 18.9, and the fall has been uninterrupted since.

A paper by Dr. W. H. Symons, entitled "Statistics Concerning Consumption and Other Preventable Diseases," in *Public Health* for June, 1901, reviews some of the registration figures for England and Wales and for three English counties. The author points out that while the total number of men killed in action or dying in the service of the army during the seven years' war with France, 1793 to 1800, was 48,971, and while the total reported loss by wounds

and disease in the South African war up to the end of 1900 was 12,158, consumption killed 60,139 persons in England and Wales in the year 1898 alone. The distribution by age periods makes the serious nature of the disease still more obvious. While the percentage of deaths from tuberculosis to total deaths in 1889-90 was only 12.7 for all ages, it was 42.8 between 15 and 25, and 40.2 between 25 and 35. It is, of course, true, that the death rate is decreasing, but it is interesting to note that the decrease is mainly in tuberculosis of the lungs among adults.

REDUCTION PER CENT IN MORTALITY FROM TUBERCULOSIS, 1861-70 AND 1891-97.

	All Forms.		Lungs.		Bowels.		Brain	
	M.	F.	M.	F.	M.	F.	M.	F.
All Ages.....	31	42	35	49	23	24	39	31
Children under 1 Year.	15	15	55	58	4*	1	42	40

*Increase.

These statistics, exhibiting a stationary rate of tubercular disease of the intestines among children, are used by Dr. A. Newsholme in an article on "Tuberculosis in Relation to Milk Supply," in the same periodical, as an argument in favor of the belief that cow's milk is an important factor in the spread of intestinal tuberculosis. He points out in this connection the striking fact that, while only 3.6 per cent of the deaths from consumption of the lungs occur in children under 5, 78.2 per cent of the deaths from consumption of the bowels occur at that age-period. These English statistics are certainly striking; but the maintenance of a high death rate from tabes mesenterica in children is not a constant factor in other countries.

The *Lancet*, for August 10, 1901, contains a paper on "The Mortality from Phthisis and from other Tuberculous Diseases," by T. E. Hayward, in which a calculation is made of the increased expectation of life which would ensue if the diseases named were eliminated from the causes of death. Life tables are calculated on this basis for the periods 1851-60 and 1881-90.

It appears that the expectation of life at birth during the second period would have been increased a little over two and a half years

if there had been no deaths from phthisis and over 3.7 years if there had been no deaths from any tuberculous disease. Between the ages of 2 and 10 the increase by the elimination of phthisis would have been over 3 years.

TOTAL LIFE CAPITAL IN YEARS IN ENGLAND AND WALES AT THE MIDDLE OF THE YEAR, 1891.

Total Life Capital.	Increase due to Elimination of	
	Phthisis.	All other Tubercular Diseases.
Males.....509,090,868	31,333,250	2,918,312
Female.....561,118,572	28,344,687	2,946,730

A review of "The Outbreak of Small-Pox in London" by Dr. William R. Smith in the *Journal of State Medicine*, for November, 1901, quotes the statistics as to small-pox cases admitted to the hospitals of the Metropolitan Asylums Board from 1890 to 1900. During this period there were 1247 admissions of this disease and 176 deaths; only 177 of the cases and two of the deaths were among children exhibiting evidence of proper vaccination. The proportion of vaccinated children in London is reckoned by Dr. Smith at 70 per cent, so that the reduction of mortality is very striking. The difference in fatality rates between 16.3 for the unvaccinated and 1.1 for the vaccinated, is, at any rate, convincing.

C.-E. A. WINSLOW.

COST OF HOME-COOKED AND PURCHASED FOOD.

In 1898 the Committee on Domestic Service of the Boston Branch of the Association of Collegiate Alumnæ undertook a consideration of the possibility of having more housework done outside the home. Investigations were begun in laundry work, cleaning, and foods, but the Committee soon found it wiser to confine their work to but one of these subjects at a time, and that of foods was chosen as the most important. At first the attempt was made to get at the desired in-

formation through a number of careful experimenters in their own homes, but again it was found that accurate results could only be obtained by detailing to the work one person who should give definite time to experiments in a laboratory. Accordingly, Miss Gertrude Bigelow, a graduate of Wellesley in 1893, carried on the necessary investigations during the year 1900-1901, at the School of Housekeeping in Boston.

Miss Bigelow undertook to determine for home-cooked foods (1) the cost of materials, (2) the cost of labor, (3) the cost of fuel, (4) the cost of wear and tear on equipment and of waste, and (5) the quality as compared with ready-cooked food. The cost of material could be determined with comparative accuracy, but in the measurement of the other four factors many practical difficulties were encountered. For instance, in preparing foods at home, the housekeeper cooks several things at once, so it is very difficult to determine just how much labor, fuel, and wear and tear on utensils is represented in the preparation of each. Again, we have no standard for the quality of food because tastes differ so widely.

For the general computations in these experiments the cost per hour for labor was taken as eight and a half cents, this figure having been estimated from the determinations of the average wage for houseworkers and cooks, made by the Women's Educational and Industrial Union, and by Professor Lucy M. Salmon. In calculating the cost of fuel, experiments were made with coal, oil, and gas stoves. The same weight of food was cooked in each instance, and the time required for cooking with each fuel recorded. A great variety of foods was used in this testing of fuels, six different and complete menus being prepared on successive days, and the cost of fuel for each dish calculated. It was found that coal, at least for this section of the country, is the cheapest of the three fuels, and gas the most expensive but the most convenient and economical from the standpoint of labor. It is not safe, however, to make a broad generalization from this statement, since the cost per hour will always vary with the stove. The items of wear and tear and of waste had to be discarded from the investigation because no house manager could be found who could give an accurate statement of their cost, a circumstance which throws much light on the present disorganized condition of house-management. The standard for

quality of food, arbitrarily adopted in this investigation, was the combined judgment of fourteen students at the School of Housekeeping.

Having determined the cost of labor and fuel approximately, Miss Bigelow next made a comparison of home-cooked and ready-cooked bread and meats. The actual cost of home-made bread does not differ materially from that of baker's bread, but in most cases the items of fuel and labor may be discarded, for the fuel would be burned anyway, and the houseworker is hired by the week, so that the expense for labor is the same whether she makes bread or not. Under these conditions the cost of home-made bread would be only that for materials, and would be much less than for baker's bread. Furthermore, there is a very considerable difference in the quality of the two, and it is an open question whether home-made bread will not go farther than the same weight of baker's bread. Similar comparisons were made between home-cooked meats and those cooked outside the home, and again it was found that the home-cooked food was somewhat cheaper. Estimates were also made of the cost of the entire food consumed by a family, first, when the foods were all prepared in the home, and second, when it was delivered ready for the table. One series of experiments showed that the cost per person for food purchased ready-cooked was about 55 per cent more than that for home-cooked food, and a second series showed it to be about 30 per cent more where the first gave 55. The results of these experiments were not expected to be quantitatively accurate. The work was undertaken merely to answer practically the question as to whether it would be possible to purchase ready-cooked all the food required by a family, and what its relative cost would be as compared with the home-cooked food.

The above investigations prove very conclusively that the cost of food prepared outside the home is to-day greater than that of the same food home-cooked. Nevertheless the introduction of ready-cooked foods into a household can be shown to save ultimately labor, fuel, space, waste of food and equipment of the kitchen. The question arises as to whether this saving will not more than counterbalance the extra expense. Furthermore, would it not be possible for the housekeeper who now devotes herself to household duties, to employ her

time in some more remunerative occupation, and thus add to the family income more than the extra cost of ready-cooked foods substracts? These are questions that the future alone can answer. Meantime, it cannot be denied that there is today a tendency to have more and more work done outside the home, although it is a disputed question as to how far this tendency will be carried. One caterer reports that his sale of ready-cooked foods is five times greater than two years ago, and everywhere the sale of these foods has been so rapidly growing that a still greater increase may reasonably be expected in the near future. With an increased demand will come, in all probability, a decrease in price, an improvement in quality, and in means for delivering the food hot and ready to serve.

The work of the Committee on Domestic Service, whatever else may have been its result, is of great value, since it begins the investigation on a scientific basis of existing conditions in house-management. Although the inquiry has been limited, it has shown that the average housekeeper, practical and experienced though she may be, can give no accurate estimate of fuel, labor, living expenses of the employé, wear and tear of equipment, etc., and until these items and the numerous other family expenditures are definitely recognized and determined, the economic and scientific management of the household cannot be hoped for.

AVA M. STODDARD.

A STUDY OF MUNICIPAL GROWTH.

The Population and Finances of Boston. A Study of Municipal Growth. By Frederic H. Fay, M.S., Boston, 1901. 8vo, 33 pp., with 3 charts.

In this volume the author has attempted, by a careful survey of the past, to forecast the future growth of Boston in population, and to estimate the future increase in the valuation, income, expenditure and net debt of the city. It is assumed that, unless conditions radically change, the future growth along all these lines will continue about the same as in the past. The laws of growth, according to which the population has increased and the finances have developed, have been determined by an application of the method of least

squares to the data available in the past experience of Boston. By this method formulæ have been derived having the general form

$$X = A + Bt + Ct^2$$

in which X is the quantity sought, t is the time in years from 1900 (being negative prior, and positive, subsequent to that year) and A, B and C are constants derived mathematically from the observed data. Generally speaking, the growth of the population has been continuous from census to census from 1790 to 1900, and the finance statistics, too, have mounted upward, in such manner that, if plotted, the lines graphically representing the increase show an upward sweep.

Mr. Fay has shown care and discrimination in the use of his data. He has found the equation of the curves most closely fitting his various series of facts, and it is not unreasonable to suppose that the curves as extended to represent the predicted future growth will approach as closely the data actually recorded, in the near future, at least, as any that can be drawn on the basis of past experience.

To most statisticians the method of least squares must always form an almost insuperable obstacle. It is employed by astronomers and civil and mechanical engineers, but for the most part to correct several observations of the same fact when those observations show discrepancies. It is also used to a limited extent in such problems as the author here has before him. Other simpler methods may, however, be employed which are quite as satisfactory. The whole subject of the application of the theory of probability to statistics is admirably discussed in Part II of Bowley's *Elements of Statistics*. In the preface to his book (p. vii), writing of the method of least squares, Mr. Bowley remarks that "the phrase, useful in some connections, seems to make the application of the Law of Error to statistics unnecessarily complex."

This criticism, if so it may be called, does not in the least detract from the excellent work presented by Mr. Fay in his study of the municipal growth of Boston. The problems assigned him have been worked out in such manner and the solutions presented in such form that if the predictions prove to be wide of the mark it will not be

the fault of the prophet. The complexity of the determining conditions in such data as are here discussed make distant forecasts of even approximate accuracy well-nigh impossible.

F. S. CRUM.

EARLY CONGRESSIONAL DOCUMENTS.

Public Documents of the First Fourteen Congresses, 1789–1817. Papers relating to early Congressional Documents, prepared by A. W. Greely. Washington, 1900. 903 pp. (56th Congress, 1st session. Senate Doc. 428.) 8vo.

A pamphlet by General Greely, which appeared in 1897 on the same subject, was mentioned in the *Publications* in June, 1900 (vol. VII, page 57). The present greatly enlarged volume consists of four distinct parts: 1st, pp. 3-17, an introductory and historical essay; 2d, pp. 19-855, the main body of the volume, a List of the Journals, Reports and other documents of the first fourteen Congresses, with notes showing the character of the documents and the libraries in which the original editions may be found; 3d, pp. 856-858, a list of the most important publications containing reprints, in whole or in part, of the Proceedings, Journals, Documents, etc., of the early congresses, also of indexes and other finding lists to the Congressional documents; 4th, pp. 859-903, an index of names.

General Greely has collected a great many more titles of early documents than have ever been before brought together, and his compilation will doubtless supersede the early pages of Poore's *Descriptive Catalogue*, until General Greely's work, in turn, is surpassed by an even more nearly perfect list, such as we hope will be provided in the promised new *Checklist* from the Government Documents Office.

The fourth part of General Greely's book, the Index of names, is an especially valuable addition to our list of aids in the use of Government publications of early date.

L. P. L.

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